

AMERICAN GAS

ASSOCIATION

MONTHLY

JUNE • 1938

Ten Years of Natural Gas Progress

N. C. McGOWEN

•

Cooperation and Gas Promotion

MERRILL DAVIS

•

The Odorization of Natural Gas

E. L. HENDERSON

•

Gas Consumption of Water Heaters

PAUL L. BETZ



Professor Quiz

INTERVIEWS A GAS MAN:

- Q. *What is the place of gas fuel in industry today?*
A. "Gas fuel is not only holding its place in the industrial field, but is handling the major portion of that added heating load in industry which is for refinement and betterment of product and is displacing other fuels rapidly in all kinds of applications."
- Q. *What has a prominent sales manager of a large gas company said of a properly supervised dealer cooperation program?*
A. "Viewing the future with optimism, it is realized that well organized, properly supervised dealer cooperation programs means better trade, improved customer relations and increased gas sales."
- Q. *Why is air conditioning better with gas?*
A. "Because the humidity and temperature may be controlled more accurately and economically with gas-fired equipment than with any other method. The inherent features of both direct dehumidifiers and gas engine-driven refrigeration compressors make this possible."
- Q. *Have gas appliances kept pace with competing appliances?*
A. "The progress which has been made by the manufacturers in design, efficiency, and appearance of gas appliances in the last three years is far ahead of the progress made by competing fuel manufacturers."
- Q. *Are heavy duty gas engines a reliable and economical source of power?*
A. "The length of time gas engines have been operating satisfactorily certainly establishes the fact that heavy duty gas engines are a reliable and economical source of power. Gas engine power plants that have operated satisfactorily for a period of from fifteen to twenty-five years are not unusual."

Congratulations, Mr. Gas Man,* you have scored 100%!

* Of course, this gentleman had read the:

1937

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AMERICAN GAS ASSOCIATION MONTHLY

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AMERICAN GAS ASSOCIATION MONTHLY

James M. Beall, Editor

Natural Gas Leaders Review Industry's Program

KEYED to the slogan "Our Job Is a Selling Job," the convention of the Association's Natural Gas Department, held in New Orleans, May 9 to 12, set up a number of enviable standards for future conventions to attain.

It was the busiest convention ever staged for gas men. The program was one of the most ambitious ever offered. There were more meetings, parallel and otherwise, more luncheon gatherings and more huddling together in informal discussion groups than this industry has seen before. The attendance was easily 1200, counting heads, but the official convention badges amounted to 500 less. These figures, however, do not include the fair sex—hundreds of them.

New Orleans, famous for its hospitality, lived up to its reputation as "America's Most Interesting City." The boat ride on the Mississippi was an event long to be remembered. The Grand Ball attracted a large and enthusiastic following and the famous eating places and historic spots in the city were visited by most delegates throughout the convention. Other attractions provided for the ladies rounded out a week of diversified pleasure, possible only in a city that has the rich historic background of New Orleans.

Addresses and reports reflected an optimistic outlook, although speakers did not neglect to stress the many problems that face all American industry today, plus many special ones that have been imposed on the public utility business. Better and more intensified selling effort, the improvement of relations with the gas-using public, the ever-existing need for market analysis and study, the promotion of Association-sponsored plans such as National Advertising, the Liberty Home and the Certified Performance Range—these and many others were high-spotted by speakers qualified in every respect to give a note of authority to their addresses. No live issue was neglected. If any convention ever justified the term of "liberal education," this one did.

The first General Session opened with an address by Robert W. Hendee, chairman of the Natural Gas Department, who pointed out that the natural gas business is in as near a stabilized condition as any in America. "The industry con-

cerns itself only in the program of attending to its own business," he said. Later in his address he summed up both the slogan and the spirit of the convention in these words: "Our job is a selling job. Let's not meet competition—let's make competition. A good offense is the best defense. The Association's programs now in progress are the coordinating agencies that should help all of her members do a good selling job."

President McGowen's address, which followed and appears in full elsewhere in this issue, reviewed ten years of progress in the industry. He stressed the point that the two phases of the industry are entirely common with the exception of production and transmission of the respective gases, and even here the interests of the two branches are becoming more and more inter-related.

Merrill N. Davis, president of the A.G.A.E.M., made a forceful plea for cooperative action to develop the domestic load. "We have been criminally negligent in leaving the most vital part of our business—cooking, suffering from arteriosclerosis" he declared. Mr. Davis' stimulating call to action appears elsewhere.

In his address "Pooling of Royalty Interests under Gas Producing Areas," J. French Robinson described the procedure by which his company has succeeded in unitizing gas leases on 47,500 acres of gas lands, at a cost of less than fifty cents an acre. Under the unit system the company is free to drill wells economically and at geologically favorable locations, and royalties are prorated among the property owners in the unit.

The first morning session ended appropriately with a splendid presentation on the national advertising program by W. W. Winter, who closed his address with the statement: "When you talk about the national advertising campaign you are talking about the gas business itself, for advertising merely presents the front of our business to the public. Unless we follow through, unless we make good in the conduct of our own business, this advertising campaign is worse than wasted effort. What we need—what we must have in the gas industry is a powerful united effort, in which



Top row, left to right: (seated) Alexander Forward, New York; President N. C. McGowen, Houston; J. H. Dunn, Dallas; (standing) Hugh Stalcup, Tulsa; E. O. Bennett, Ponca City; (center) Harold E. Meade, New Orleans; A. L. Forbes, Jr., El Paso

At left: (with hats) Marshall Newcomb, Dallas; Roy C. Coffee, Dallas; T. J. Uhl, Dallas; (seated) J. P. Briston, Omaha; B. L. Rogers, Dallas; S. W. Taft, Omaha; R. Vandercreek, Dallas; O. H. Moore, Dallas



Bottom row: E. H. Poe, Dallas; Robert W. Hendee, Colorado Springs, chairman, Natural Gas Department; President McGowen and an attractive registration clerk; D. A. Hulcy, Dallas; Harry A. Ward, Shreveport; J. P. Jackson, Shreveport

all the component parts of the industry are working together, fighting side by side to carry the entire industry on to new heights of effective service to her customers."

The first speaker at the afternoon session, under the chairmanship of T. R. Weymouth, was Alexander Forward, managing director of the A. G. A. He declared that the natural gas industry and the A. G. A. were one and the same thing. He pleaded for more letters of inquiry from members of the natural gas department and complimented Mr. Hendee and E. Holley Poe for their efforts in staging such a successful convention.

Alexander Mahood, president, National Association of Utilities and Railroad Commissioners, advocated a closer cooperation between the commissioners and the utilities they regulate and a franker exchange of views on problems both must face and solve.

Forty-three states, Mr. Mahood said, and the District of Columbia have jurisdiction over natural gas utilities, including rates, services, facilities and accounting. He said utility books and reports should reflect costs in sufficient detail and description so that the com-





mission and its employees may be able to determine the use made of the utility's plant, its cost, and the annual outlay for expenses.

The commission president issued a warning concerning utility taxes and costs as they affect consumer rates. He said state and federal commissions have prided themselves upon rate reduction and savings to users of utility service, effected during the past three years. "The records show that since 1934 not less than 300 million dollars have been cut from annual utility bills by commission action, but with this achievement behind us, we as commissioners are now faced with the alarming disclosure that state and federal governments have, during this period, tremendously increased utility taxes."

Since utility taxes are legitimate expenses and in the last analysis paid by the consuming public, Mr. Mahood declared it time for someone to "call the attention of users of utility service to what is being done to them so they may understand why commissions are unable to bring about as large reductions in rates as the public may believe they are entitled to. It may be

Top row, left to right: George W. Bean, Washington; Merrill N. Davis, Bradford; Streuby L. Drumm, New Orleans; unidentified delegate; Thomas R. Weymouth, New York, vice-chairman, Natural Gas Department



At right: (standing) George S. Jones, Jr., Evansville; Norman R. McKee, Los Angeles; Louis Ruthenburg, Evansville; (seated) C. W. Sears, Pasadena; Col. M. W. Walsh, Louisville; R. J. Lindsay, Stuttgart



Bottom row: Major Forward, New York; Major T. J. Strickler, Kansas City; R. S. Reading, El Paso; Margaret Marable, New York; T. B. Gregory, Pittsburgh; J. R. Munce, Pittsburgh



the users should organize and actively protest increases in utility taxes so that they will be relieved of this burden and enjoy the benefits, in many instances, of reduced rates."

Mr. Mahood pointed out that if the demand for utility service continues to fall and taxes and operating costs continue to increase, the results may seriously affect the ratepayer.

"New Thoughts and Old First Principles" was the subject handled by Cecil F. Elmes, of Sanderson and Porter, New York.

He contrasted the progress of an old-fashioned utility with the complexities of a present-day utility, operating in the face of a flood of legislation, new regulatory bodies, new powers and new methods, and "new principles to control and justify these methods."

Under the chairmanship of Miss Mildred R. Clark, chairman of the A. G. A. Home Service Committee, the remainder of the meeting was devoted to a presentation of home service subjects by Miss Albertine Berry of Dallas, Miss Karen Fladoes of Chicago, and Miss Grace Larrabee of Algiers, La.

Technical and Research Report

The second General Session opened with H. C. Cooper, president of the Hope Natural Gas Co., Pittsburgh, in the chair. Mr. Cooper presented the report of the Main Technical and Research Committee of which he is chairman. Reporting for the Pipe Line Subcommittee, H. D. Hancock, of New York, stressed the importance of the study of gas hydrates as relating to pipe lines and pointed out that the investigation had determined that high gasoline content of the natural gas enhances the tendency to form hydrates.

N. C. McGowen delivered the report of the subcommittee on Gas-Well Deliveries. He stated that deep drilling, particularly in the fields of the Gulf coast, has confronted both the natural gas and oil industries with a new problem that requires careful study, that of the combination oil and gas well producing fluid from great depths, and at high pressures and temperatures.

This trend toward deeper drilling tends to the wasting of gas through

its discharge into the air, he asserted, since many of these deep wells have more gas in solution in the oil at higher pressures. In some instances 20,000 cubic feet of gas are released in bringing one barrel of fluid to the surface.

If excessive dissipation of gas is permitted, he said, there will be a public reaction against waste of a valuable natural resource. Both the oil and natural gas industries are coming to the realization that these deep fields in many instances constitute important natural gas reserves.

Gas produced with oil, said Mr. McGowen, should be handled and marketed in an orderly manner, and where possible, through existing transmission lines. In some fields the problem of excess gas is being solved temporarily by recycling it back into the ground, to maintain reservoir pressures and increase the ultimate recovery of the oil reserves.

The session ended with a report by R. M. Conner, director of the A. G. A. Testing Laboratories, on "Utilization Aspects of Natural Gas." Mr. Conner described various research projects carried out by the Laboratories and emphasized the point that today's gas ranges are still superior.

Salesmanship Emphasized

Davis M. DeBard, vice-president, Stone and Webster Service Corp., New York, was the first speaker at the final General Sessions meeting. His subject was "Will A Wife Tell Her Husband?" Answering this question, he says a wife will tell her husband what to buy and it is, therefore, necessary for the gas industry to sell her on the value of gas service.

"The operation of a gas company is no longer a matter of pipes, pressure and perspiration," he concluded. "Today we must include salesmanship. And by salesmanship, I do not mean just a few more improperly paid, untrained men going around with the title of salesmen. I mean a whole organization inspired by the same fervor that each of us here has today to put gas in the front rank and keep it there."

A particularly live subject "The Gas Industry's Stake in Air Conditioning" was the title of the address delivered

by L. R. Boulware, vice-president of Carrier Corp., Syracuse, N. Y. To realize upon the opportunities in air conditioning, he recommends that the gas industry: air condition its own offices and display rooms; advertise air conditioning and the place of gas in it; give consideration to rate schedules to make any needed improvement in competitive position; organize and carry out a promotional effort in the dehydration field; take full promotional advantage of opportunities for both heating and cooling phases of commercial and residential comfort air conditioning.

Concluding, he says: "We now have specific equipment for known needs and all that remains to be done is the acceleration of our pointing out and satisfying those needs."

Customer Surveys Urged

A plea for more market analysis, research and customer surveys was made by Franklin T. Rainey, of The Ohio Fuel Gas Co., in his address "How Can We Further Entrench Industrial and Commercial Gas Sales?" More load would be secured, he said, if the utility employee were to work with the equipment manufacturer's representative in making contacts leading to sales. There is every advantage to be gained by this mutual effort, he declared.

Julian Foster of the Lone Star Gas Co., delivered the report of the Wrinkle Award Committee. The following winners were announced:

Transmission—Adrian Butcher, The Ohio Fuel Gas Co.; Gomer Stelljes, New York State Natural Gas Corp.; J. F. Francis, Lone Star Gas Co.; R. G. Coleman, Lone Star Gas Co.; W. J. Gray, The Canadian Western Natural Gas Light, Heat & Power Co., Ltd.

Safety—J. G. Montgomery, Jr., United Natural Gas Co.; R. M. Scofield, Lone Star Gas Co.; Jacob L. Cole, Hope Construction & Refining Co.; John Selogy, The East Ohio Gas Co.; F. J. Bockmier, St. Mary's Natural Gas Co.

Production—Irving Aneshansley, Ohio Fuel Supply Co.; W. R. Cole, Peoples Natural Gas Co.; C. J. McCue, The East Ohio Gas Co.; Harry Harris, The East Ohio Gas Co.; Roy M. Helm, Lone Star Gas Co.

Office—E. E. Keeler, Equitable Gas Co.; R. O. Cox, Lone Star Gas Co.; E. E. Stovall, Lone Star Gas Co.; D. A. Sillers, Lone Star Gas Co.; E. G. Austin, The East Ohio Gas Co.

Distribution—W. M. Wood, Kansas City Gas Co.; C. H. Eakin, Peoples Natural Gas Co.; M. L. Snodgrass, The East Ohio Gas Co.; Harold M. Jackson, Peoples Natural Gas Co.; Donald J. Miller, Public Service Co. of Colorado.

Norman R. McKee, vice-president of the Southern Counties Gas Co., Los Angeles, presented the report of the Resolutions Committee, which recommended that the Association undertake a study of pure and applied gas research with a view to establishment of an Institute of Gas Research. The report also paid tribute to the work of committee members and officers of the department headed by Chairman Hendee, Vice-Chairman Weymouth, Secretary Poe and Managing Director Forward.

Committee Work Commended

A special resolution was offered expressing appreciation for the work and effort of Jay C. Barnes, general chairman; W. T. Harter, chairman, Publicity Committee; H. E. Meade, chairman, Program Committee; A. B. Lindauer, chairman, Arrangements Committee; A. S. Legendre, chairman, Entertainment Committee; S. L. Drumm, chairman, Hotel and Housing Committee; C. L. Nairne, chairman, Reception Committee; J. H. Collins, chairman, Registration Committee; J. J. Kornfeld, chairman, Transportation Committee; and Dorothea Schlesinger, general chairman, Women's Committees. The report was unanimously adopted.

The first speaker at the closing General Session was L. T. Potter of the Lone Star Gas Co. He covered the subject, "The Effect of Pipe Line Storage and Operation of Supply upon Transmission Line Capacities During High Demand Periods."

Mr. Potter presented the general conclusion that the effective capacity of a gas transmission system which is subject to a variable demand can be determined accurately only by the use of an analysis, which takes into consideration the following factors: (1) Maximum capacity of the system under

straight flow conditions; (2) Characteristics of the demand requirements to which the system is subjected under high load conditions; (3) Net available pipe line storage capacity of the system.

"Rural Gasification Activities" were described by J. Woodward Martin of the Lone Star Gas Co. He said a vast rural market exists for gas service and, using U. S. Census figures, declared there are fifteen million families who are without gas service.

"This, in terms of population," he asserted, "amounts to about seventy-five million people, which is about half the population of the United States."

He closed his address with the statement that existing organizations and facilities of present natural gas companies definitely place them in a most advantageous position to expand their services and secure for themselves additional revenues from the rural market.

Liquefied Gas Sales

The last speaker was E. Q. Beckwith of the Phillips Petroleum Co.,

Bartlesville, Okla. Speaking on the subject "Beyond the Mains with Liquefied Petroleum Gas," he said, in part:

"Liquefied petroleum gases are being used throughout the country on a large scale for industrial, utility and domestic purposes. An increase in sales from 1,000,000 gallons in 1927 to over 130,000,000 gallons in 1937 shows widespread public acceptance of these high form value fuels.

"The natural gas industry has already taken advantage of these fuels in providing standby and peak-load production facilities. The protection provided Chicago during a pipe line break this past winter clearly indicates the high value of propane and butane during such emergencies.

"Propane or butane can serve the natural gas industry in other ways by:

"(a) Supplying small cities which later may be reached by transmission lines.

"(b) Securing and holding new consumers on the fringe of present properties, pending main extensions."

The next convention will be held in Tulsa, Okla., in May, 1939, the exact dates to be announced later.

Characteristics of Hydrocarbon Fluids from a "Combination" Well

PRELIMINARY results of a study of the phase relations of fluids in a deep high-pressure, high-temperature reservoir of gas and light gravity hydrocarbon liquid were discussed in a report made public by the Bureau of Mines, Department of the Interior, at the convention of the Natural Gas Department, American Gas Association, held May 9-12 in New Orleans, La. A study of well performance and liquid recovery at several rates of fluid delivery, and analyses and measurement of physical properties of fluid samples taken under stabilized conditions of pressure and flow gave the data essential to the investigation.

Knowledge of the phase relations of the fluids that exist in the porous spaces of rocks constituting natural petroleum reservoirs and of the behavior of these fluids under various field conditions of operation is essential to the conservation of petroleum and natural gas and to their efficient recovery.

In the course of the tests made by the Bureau of Mines, surface samples of hydrocarbon liquid and gas were taken at the separator under conditions of stabilized flow for re-mixing in the proportions of the measured ratio of gas to hydrocarbon liquid to provide a system on which phase

relations at reservoir and flow-string pressures and temperatures could be determined. A subsurface sample of hydrocarbon liquid from the well bore provided a liquid phase that in composition and properties closely approximated a liquid that could originate in the reservoir.

Although comparison of the gas-hydrocarbon liquid ratios of the well under several rates of fluid delivery did not indicate conclusively the presence of a hydrocarbon liquid phase in the reservoir, the field tests showed that hydrocarbon liquid was present in the well bore while fluid was being produced from the well.

It was concluded that part of the fluid recovered from the well was present in the reservoir in the liquid phase, and the remainder was formed during the process of production by condensation of heavy components from the original reservoir vapor phase.

The report has been published as Report of Investigations 3402, Flow Characteristics, Composition, and Some Liquid-Phase Properties of Hydrocarbon Fluids from a "Combination" Well, by C. K. Eilerts and M. A. Schellhardt. Copies are available without charge upon request from the Bureau of Mines, Washington, D. C.

Ten Years of Progress

THE slogan—"Our Job Is a Selling Job"—reflects the history of the gas industry, which now occupies a highly important place in the social, economic and financial life of the United States, and the future history of the industry depends largely upon continuing to use this slogan, and upon enlarging the possibilities offered by it. Some of the most significant and important developments in the gas business have occurred during the past 10 years, during which period of time we have had a Depression, and started on a Recession.

Let us forget for the moment the technical problems and the more or less detailed localized worries that have faced us during these 10 years, and look at the general over-all statistics of gas consumed for domestic, commercial and industrial uses—and we will be convinced there is much room for continued expansion and development of the gas industry.

Cities, Towns and Communities Supplied with Gas

In 1926, about 4,515 cities, towns and communities in the United States were served with either natural or manufactured gas, of which 1,878 were supplied with natural gas, and 2,637 with manufactured gas. By 1936, 8,601 cities, towns and communities were served with either natural or manufactured gas (an increase of 90 per cent), of which 5,150 were supplied with natural gas (an increase of 174 per cent) and 3,451 with manufactured gas (an increase of 31 per cent). The number of cities, towns and communities served with natural and manufactured gas in different sections of the United States are as follows:

- I. Northeastern States, including Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, Mary-

By N. C. McGOWEN*

President, American Gas Association

land, Virginia, West Virginia, Ohio, Kentucky, Indiana, Michigan, and District of Columbia;

	1926	1936
Natural gas	1,283	2,418
Manufactured gas	1,679	2,427
Total	2,962	4,845

- II. Southeastern States, including Tennessee, North Carolina, South Carolina, Georgia, Florida, and Alabama;

	1926	1936
Natural gas	0	132
Manufactured gas	55	193
Total	55	325

- III. North Central States, including Wisconsin, Illinois, Missouri, Iowa, Minnesota, Wyoming, and Colorado;

	1926	1936
Natural gas	47	521
Manufactured gas	508	635
Total	555	1,156

- IV. Southwestern States, including Kansas, Oklahoma, Arkansas, Texas, Mississippi, Louisiana, and New Mexico;

	1926	1936
Natural gas	468	1,675
Manufactured gas	37	8
Total	505	1,683

- V. Western States, including Arizona, Utah, Idaho, Washington, Oregon, California, and Nevada;

	1926	1936
Natural gas	80	481
Manufactured gas	281	188
Total	361	669

The number of cities, towns and communities served with gas in each section of the country has increased appreciably since 1926, but the possibilities in each section of the country for continued appreciable increases are apparent. Much of the development in domestic gas utilization during the past 10 years has been in supplying gas service to numerous towns and communities. For example, 93 cities

in the United States had a population of 100,000 or greater according to the census survey for 1930, and all these cities were supplied with either natural or manufactured gas prior to 1926; the only significant changes in gas service to these cities were changes in 18 of them from manufactured to natural gas or to a combination of manufactured and natural gas.

Manufactured Gas Sales

In 1929, the domestic sales of manufactured gas were approximately 256 billion cubic feet; industrial and commercial sales, 93 billion cubic feet; and total manufactured gas sales were 365 billion cubic feet, including miscellaneous uses. Domestic sales decreased gradually each year to approximately 204 billion cubic feet in 1936 (a decrease of 20 per cent from 1929), however, decreased domestic sales were offset in part by increased industrial and commercial sales.

Industrial and commercial sales decreased gradually each year from 93 billion cubic feet in 1929 to 68 billion cubic feet in 1933, and then increased annually to 105 billion cubic feet in 1936. A marked increase from 87 to 105 billion cubic feet (21 per cent) occurred from 1935 to 1936 in commercial and industrial sales. As a result of increased commercial and industrial sales the total manufactured gas sales in 1936 were approximately 97 per cent of the sales in 1929. Total manufactured gas sales reached a low of 313 billion cubic feet in 1933 but then increased each year to 383 billion cubic feet in 1936.

Natural Gas Production and Utilization

Production and consumption of natural gas during the past 10 years is particularly significant. Total marketed natural gas production increased gradually each year from 1.31 trillion cubic feet in 1926, to 1.94 trillion cubic feet in 1930, then decreased to a new low of 1.55 trillion cubic feet in 1933, after which it has increased each

* Mr. McGowen is president of the United Gas Pipe Line Co., Houston, Texas.

Presented at Natural Gas Department Convention, New Orleans, La., May 10.

year to approximately 2.5 trillion cubic feet in 1937. This surpasses the 1936 record by about 15 per cent, and is 61 per cent greater than the low for 1933.

A large part of the marketed production has been from the three southwestern States of Texas, Oklahoma and Louisiana. In 1926, the total marketed production from these 3 states was 0.62 trillion cubic feet (47 per cent of the total); in 1929, 1.08 trillion (56 per cent); in 1933, 0.92 trillion cubic feet (59 per cent); in 1937, 1.61 trillion cubic feet (64 per cent). According to 1937 estimates, Texas now supplies 31 per cent of the marketed production of the United States; Oklahoma, 14.5 per cent; and Louisiana 19 per cent.

Industrial Consumption

Particularly significant in utilization of natural gas has been the phenomenal rise in industrial consumption. In 1926, approximately 1.02 trillion cubic feet of natural gas were used for all industrial purposes, including field operations and manufacture of carbon black; in 1929 industrial utilization had increased to 1.56 trillion cubic feet; in 1932, a new low of 1.17 trillion cubic feet was reached, but by 1937 industrial utilization had increased 67 per cent from the low of 1933 to approximately 1.96 trillion cubic feet.

Another bright spot in the natural gas business has been the gradual increased use of natural gas for commercial purposes. Commercial utilization of natural gas increased from 65 billion cubic feet in 1926, to 80 billion cubic feet in 1929, to 135 billion cubic feet in 1937; and increased 13 per cent in 1936 over 1935, and 17 per cent in 1937 over 1936.

Domestic utilization of natural gas increased gradually each year from 224 billion cubic feet in 1926 to 280 billion cubic feet in 1929, was slowed down to 283 billion cubic feet in 1933, and since has increased each year to 400 billion cubic feet in 1937. There was an increase of 10 per cent in 1936 over 1935, and 16 per cent in 1937 over 1936.

These trends in natural gas production and utilization can be correlated

with important gains in domestic, commercial and industrial consumers; increased use of gas for home heating and refrigeration; growing demand for gas to heat office buildings, apartment houses and hotels; increased commercial gas refrigeration; trends of industrial activity of basic industries; and increased advertising activity on the part of gas companies through the American Gas Association.

Natural Gas Reserves

A recent estimate of the natural gas reserves of the United States indicates 62 trillion cubic feet to be presently in sight, and, of this amount, about 47 trillion cubic feet, or about 76 per cent, are located in the southwestern states of Mississippi, Louisiana, Arkansas, Texas, Oklahoma, Kansas and New Mexico. Upon the basis of the 1936 rate of withdrawal, a life of 28½ years is indicated for the United States, and about 33 years for the Southwest, that is, without taking into consideration the future discovery of additional reserves occurring every day.

Gas Conservation

Conservation of our natural gas reserves and conservation in the production, transmission and utilization of natural gas has been faced positively by your gas association and the gas companies themselves, and the gas industry can pride itself on accomplishments in this regard during the past 10 years. We have encouraged sound conservation policies and have advocated sound conservation laws with proper enforcement. Realizing the importance of proper utilization of gas produced with oil, we recently have been supporting actively studies designed to permit the proper use, in an orderly manner, of more of the gas produced with oil, heretofore blown to the air and wasted.

Gas Pipe Lines

An inspection of a map showing the natural gas transmission lines of the United States in 1929 would reveal 4 localized areas in which such lines operated: (1) an area in the northeastern part of the United States, including Ohio, Western New York, Western Pennsylvania, West Virginia,

and Kentucky; (2) the southwestern states of Texas, Louisiana, Arkansas, Mississippi, and Kansas; (3) the Rocky Mountain area, including Wyoming and parts of Montana; and (4) California.

At that time, approximately 57,000 miles of natural gas pipe line were being operated in the United States. In 1936 approximately 85,000 miles of gas pipe line were being operated, and natural gas service had been extended to Missouri, Illinois, Iowa, Minnesota, Michigan, Indiana, Eastern Pennsylvania, Virginia, Nebraska, New Mexico, Arizona and Washington. Additional pipe lines also were built by 1936 in states which were being served in 1929. The first real long transmission lines were built during this period of time from 1929 to 1936, and the successful operation of these lines has opened new possibilities of developing and supplying gas markets far removed from sources of supply.

Manufactured Gas and Natural Gas Coordination

The coordinated efforts of the manufactured and natural phases of the gas industry in general over-all national policies affecting gas merchandizing, legislation, regulatory matters, rates, national advertising, and other similar matters, which have been combined under the American Gas Association, have been beneficial, and is an important development of the past 10 years. The two phases of the industry in reality are entirely common with the exception of production and transmission of the respective gases, and their interests are becoming more and more inter-related.

In 1935, as compared with 1926, about 50 principal cities and towns had changed over from manufactured to natural gas, due to economic factors involved in supplying gas service to them. As pointed out previously, in 1936 as compared with 1926, 18 cities with a population of 100,000 or more had changed over from manufactured to natural gas or to a combination of natural and manufactured gas. In 1936, 329 cities, towns and communities in the United States were using mixed gas—a development of the past 10 years.

Many cities, towns and communities are so located with respect to sources of supply and the natural gas facilities are such that they possibly would be inadequately served with natural gas during emergency periods; and the use of standby manufactured gas to augment the supply of natural gas during emergency periods is becoming a sound operating policy. The fact that leaders in the gas industry now are basing their operating plans to supply a city, town or community with natural gas, manufactured gas, mixed gas, butane gas, or a combination of manufactured gas and natural gas on the economics involved in the particular situation certainly better guarantees the consumer will be served most adequately and satisfactorily at the cheapest cost.

One outstanding example of combined efforts within the gas industry is the Cleveland Laboratory for testing and approving of gas burning appliances. The American Gas Association's seal of approval guarantees to the consumer a thoroughly tested and high grade make of appliance that will give safe service. To the gas industry, this seal of approval guarantees the gas being sold will be used in a satisfactory appliance. Benefits, therefore, go to the consumer of gas, to the industry, and to reputable manufacturers of gas appliances.

The Next 10 Years

This brief review of the outstanding significant happenings during the past 10 years in the production and sales of manufactured and natural gas to domestic, commercial and industrial consumers, and the progress made during that time, causes us to wonder about the possible progress of the next 10 years. Potentially, gas is usable in every home, and in most commercial and industrial processes—it is that kind of a product. Efforts should be continued to increase its sale and utilization where the economics are favorable, and where the economics are unfavorable, studies should be continued to make them more favorable.

Leaders in the manufactured phase of the gas industry have been becoming more and more concerned with decreased domestic sales, and, through

the gas association, are sponsoring special studies to find out fundamental reasons for this decrease. These same kinds of studies are pertinent to natural gas companies. Although total natural gas domestic utilization has increased gradually each year since 1926, much of this increase is due to new consumers and new communities.

National Advertising Factor

The gas industry does not desire to sell consumers more gas than they need, but it is important to sell consumers all the gas they really need and can benefit by using. Looking ahead, it would appear that, first, special efforts are needed to bolster and maintain the domestic load per customer and second, there should be a continued effort to increase the number of customers and cities, towns and communities to be served. The national advertising campaign, now nearing the end of its second year, should prove a very important factor in increasing the total gas domestic load throughout the United States.

The marked increase in commercial utilization of both manufactured and natural gas during the past 2 years is extremely important. This is a fairly constant load, and, therefore, desirable; and the future of air conditioning, gas refrigeration, and development of gas engine power is practically unlimited.

Industrial utilization of gas depends, of course, largely upon industrial activity, and any downward revision in production schedules of basic industries causes a decreased volume of gas consumed for industrial use. This apparently has been the condition during the latter part of 1937 and the first part of this year; however, the optimistic view of this situation is, first, industrial markets for gas still are far from being fully explored, and second, present low industrial production trends should start upward in the near future.

The main point for emphasis is "Our Job Is a Selling Job." I am not belittling the effect of downward rate revisions and upward taxes—these are very troublesome problems. However, if we can continue to sell our product in large quantities and to increase

these sales, we can continue to work out our rate and tax problems. Neither am I belittling the importance of properly producing, transmitting and distributing gas—the solving of production, transmission and distribution problems are of the utmost importance to the gas industry. However, I want to impress on every production, transmission, and distribution man the fact that fundamentally we are in the business to sell our product at a fair and reasonable profit, and we have to do this to keep the gas industry where it belongs. Your continued cooperation with the Domestic, Commercial, and Industrial departments of our companies and with the activities of our gas association will, in my mind, make it possible for the gas industry during the next 10 years to surpass the progress made during the past 10 years.

World's Largest Diorama To Be Fair Exhibit

THE world's largest diorama—a colored, lighted, animated architectural model of the New York metropolitan area—will be presented as their principal exhibit at the 1939 New York World's Fair by the Consolidated Edison Company of New York, Inc., and affiliated companies. (See frontispiece illustration for photograph of the diorama.)

More than 4,000 buildings, studded with 130,000 windows, will be shown in the diorama, whose 204,000-watt illumination will require the most extensive model wiring job on record. Nearly a quarter mile of brilliantly colored neon tubing will represent the city's underground electric, gas and steam networks, while the most complete model subway system yet devised, with trains designed for a "World's Fair run" of 35,000 miles, will provide transportation highlights for the exhibit. Translucent generating station models will suggest the transformation of coal into electricity, gas and steam.

The exhibit will be the most elaborate work of its kind ever constructed, combining by means of a totally new exhibition technique, effects drawn from the musical, dramatic and architectural arts. Designed by Walter Dorwin Teague, a member of the World's Fair Board of Design, the diorama will be presented with striking sound effects in cycles dramatizing the contributions of electricity, gas and steam to life in New York. Each performance will crowd into a cycle of twelve minutes the dramatic features of a twenty-four hour period in the metropolis.

Thinking Nationally, Cooperatively and Promotionally for Gas



Merrill N. Davis

THERE seems to have developed in the gas industry a most interesting characteristic, and this is particularly true in the natural gas industry. It's the dissatisfaction with things as

they are. There is now a constant search for better methods and new ideas. There seems to be a healthy disposition to depart from the old order when such departure means progress and to press forward with unremitting energy to the attainment of higher standards of service and prosperity.

Gas Industry United

The gas business today is a great industry. It is completely united, with its leaders confident that it has a great future. We have no difficulty in establishing the fact that gas, when used in modern appliances, is the most reliable, most efficient, and most economical fuel for all purposes in which heat is used in homes and in industry. At least we have no difficulty in establishing that fact whenever we undertake to do so, but in the one place where that undertaking is needed most and where it would yield most effective results for the future welfare of the gas industry, we have failed.

After much consideration myself and carefully checking the opinions of those who are in a position to know, we are forced to a most uncompromising conclusion. Stated bluntly, that conclusion is that we have been criminally negligent in leaving the most vital part of our business, I mean our domestic loads, particularly in the kitchen, suffering from arteriosclerosis,

By MERRILL N. DAVIS

President, Association of Gas Appliance
and Equipment Manufacturers

and weakened to such a degree and in too many instances susceptible to the panacea being urged upon them by our competitors.

I am not criticising the quality of the gas—that is not all that must be sold to the housewife or home-owner. *Service, gas service*, is what we have to sell. While good blood is, of course, essential for good health, there are other equally important factors. A man may have good blood, but with hardened arteries, he is in a very bad condition. The same applies to gas service. There may be an adequate supply of good gas, but if the instrumentalities of its use are *passé*, then the gas service is in a very bad condition.

Retaining Old Customers

I believe it is certainly much more important to keep an old customer than to get a new one. There are in service today more than 16 million gas ranges and it has been estimated that at least 75% of those gas ranges are obsolete, non-automatic, relatively inefficient and unattractive. In other words, we have 12 million customers who are not getting as good service as can be made available to them; 12 million customers whom our competitors are trying to coax away from us by comparing obsolete gas equipment with modern electric equipment. If the comparison were made with the latest, most efficient gas appliances, the advantage would be with gas units. It is up to the gas company and the appliance manufacturer to make a strong cooperative effort to retain that load for the gas company and to capture that potential appliance business for the manufacturer.

It seems quite obvious to me that the one effective way to protect the cooking load is to induce the house-

wife to discard her obsolete gas appliance and replace it with a modern gas range which has every practical automatic feature for convenience with every operating part so designed that dependable, efficient service is insured at a minimum of cost. Surely no one here believes there is any danger of losing a customer who is using a modern gas range to even the most modern appliance for any competitive fuel.

Replacement Sales

It seems to me, too, that the fact that there were more than a million and a half modern gas ranges sold in 1937 when but a relatively few new homes were built quite clearly indicates that most of them did go for replacements. The same holds true, however, in the case of the 400,000 electric ranges that were sold in 1937—the largest number ever sold, I believe, in any one year. It indicates where our competitors are going after the business and tells us exactly where we should concentrate a lot of sales efforts.

Please do not misunderstand me. It is my purpose to emphasize the situation more than it is to criticise and to find fault because of our failure to meet the situation. As a matter of fact, I am really enthusiastic about the many evidences of a desire on the part of everyone in our industry to cooperate and to step out boldly and meet the problems that are facing our industry today. The gas appliance manufacturers have done a wonderful job during the past two or three years, and are spending hundreds of thousands of dollars every year on product research until today they have the most efficient and economical appliances that will not suffer by any comparison with the best for any competitive fuel. However we must continue in our efforts along these lines.

I think the industry is doing an excellent job in selling its appliances and services through national adver-

tising and promotion, but advertising and promotional work alone will not sell gas appliances. Upon the local gas companies and dealers fall the principal duty and responsibility of following through on these activities in accordance with their own conditions by supporting the national program in every possible way.

Gas companies' salesmen, and, in fact, their entire personnel should be thoroughly sold on the advantages of gas when used in modern appliances. They, in turn, will do much to educate the public on the advantages of gas as a fuel. A greater sales effort, more frequent sales drives, more systematic planning of sales campaigns, with the effort continually on building greater gas loads, will put profits in the pockets of all gas utility companies.

Gas Cooking Promotion

The Domestic Gas Range Division of our Association is diligently working on plans for a program for the promotion of gas cooking, and in this they have received the endorsement of the Executive Board of the American Gas Association and are endeavoring to get the endorsement and cooperation of the National Retail Dry Goods Association.

I believe we all recognize that the time is here when the gas industry must look into the future. However, we must look from a national rather than a local point of view, and I shall have the temerity to suggest for your consideration a subject that I believe has been avoided to the detriment of our industry.

The manufacturers are striving for standardized appliances that may be completely automatically controlled, and which in every section will operate most satisfactorily from a standpoint of reliability and economy. As I have said before, gas is the ideal fuel, and while it may be good in every section of the country, there is too great a variance in its essential characteristics. Unquestionably, the situation in this respect as it is today imposes a tremendous and, I believe, unnecessary expense on the gas consumer.

Appliances could be reduced in cost if the manufacturers were able to design and produce and adjust their ap-

pliances uniformly the same for every locality. As it is today, different sections require differently designed appliances, and, in many cases, improperly adjusted appliances make for unsatisfactory service. I have been told that standards for gas could be established which would permit a reasonably wide range in variations and would impose but little, if any, hardship on any local company to conform to such specifications which would insure maximum efficiency from an appliance designed to operate within that range. This is a matter of most vital concern to the appliance manufacturers, and I respectfully suggest that all gas companies give serious consideration to the establishment of more definite standards for chemical composition and delivery pressures, etc.

It is, of course, most important that Association work, to produce the best results, must be carefully planned and systematically carried out. We are endeavoring to do this and I would refer you to the sales campaigns being sponsored by the Gas Refrigerator Division of A.G.A.E.M., and the sales campaign being sponsored by the Gas Water Heater Division of our Association. These campaigns have proven to be successful in every respect and

have been carried on for the past three years. Their success shows the value of systematic planning and cooperation between the manufacturers of appliances and the gas companies.

The Domestic Gas Range Division of the Association is planning the promotion of gas cooking and the program has already been endorsed, as I have said before, by the American Gas Association, and it is hoped it may also have the endorsement of other important sales outlets. To achieve the best results, we are diligently seeking the advice of all of our outlets.

We know that in gas we have the only completely automatic fuel for house-heating purposes, and in this connection, I am very glad to advise you that our Gas House-Heating and Air-Conditioning equipment manufacturers are formulating a program for the further development of that market.

This spirit of cooperation finds its best expression in Association work. Out of this cooperative and unselfish endeavor is born the practical idealism which is exerting such a vitalizing force upon our industry. It should be continued, fostered, and in every way encouraged.

"Dress Up Your Kitchen" Gas Range Campaign

A "DRESS Up Your Kitchen" gas range campaign for Houston Natural Gas System dealers has been stepping up sales to an encouraging degree. The six-week campaign ending May 31 got under way April 14, with 60 dealers actively cooperating in the drive.

The campaign was presented to dealers in portfolio form preceding the opening of the drive, and proofs of all newspaper advertisements and direct-mail folders were included in this portfolio.

As in previous campaigns, all available advertising mediums were used—newspaper, direct-mail, window streamers, color enlargements of the national advertisement of the American Gas Association featuring the "Dress Up Your Kitchen" theme, and a feature newspaper article around which a cooperative page of advertising was built in local papers. Blotters with the message from the national advertisement were used by dealers and salesmen as calling cards during the campaign.

This "Dress Up Your Kitchen" campaign was organized by the Committee to Conduct National Advertising of the Amer-

ican Gas Association, and was released as a tie-up for dealers and gas companies. In addition to the material made available by the committee, two direct-mail pieces were secured to round out the campaign, and a feature article from *McCall's* magazine gave another means to drive home a message on the modern gas range.

During the period of the campaign, the cash down payment required for financing range sales through First Bancredit Corporation was suspended, and a homemaker could begin to enjoy the use of a modern gas range in the home without paying out a penny in cash. Payments could be budgeted over a period up to forty-eight months.

"Liberty Home" Design To Be Judged

SCORES of designs for all-gas Liberty Homes which are entered in the architects' competition sponsored by the Home Appliance Planning Bureau of the American Gas Association will be judged during the week of June 6. A complete list of winners in the nationwide competition will be announced in the July issue of *Architectural Forum*.

"Merrily We Live" In An All-Gas Kitchen

Gas display, featuring a movie kitchen set, which was the center of attraction at the Southern California Home Show



By DEKE HOULGATE

Hollywood, Calif.

HOLLYWOOD'S magic name proved a potent lure at the recent Southern California Home Show when the actual kitchen set from the Hal Roach-M-G-M laugh feature was exhibited to nearly 150,000 persons as a feature display by the Southern California gas industry.

For eleven days, from April 21 to

May 1, people from all parts of Southern California poured through the turnstiles at the huge Pan Pacific Auditorium, intent on seeing modernity as applied to home building and furnishing. They wandered over acres studded with booths displaying everything from glass brick to garage doors operated by photo cell mechanisms. They

paused before fire proofing demonstrations. They ran fingers over metal shingles and asked questions about air conditioning. And they all eventually came to a halt before the most beautiful kitchen ever designed.

Many of them returned on the 29th of April, for on that night this kitchen was the setting for the personal ap-

pearance of Patsy Kelly and Alan Mowbray, bright stars of "Merrily We Live," and two of filmdom's most popular citizens.

Never has a single display so overshadowed all others in a show of this type as did the "Merrily We Live" kitchen. The shiny monel metal work surfaces, the brightly colored pottery on open shelves, the unique arrangement of a battery of gas ranges, the attractive and well placed gas refrigerators, and the array of mixers and utensils caught all eyes.

"Too beautiful for a kitchen," or some variation of that theme, was frequently heard from awed spectators.

Occupying an island which ran from the auditorium's main entrance to the corner of the building containing the glamour kitchen was the big appliance display sponsored by the Southern California and Southern Counties Gas Companies. Latest models of ranges, refrigerators, and space and water heaters were given a futuristic setting in this exhibit, which cov-

ered an area approximately 3000 square feet in size. A half dozen representatives from the sales forces of the two utilities were on hand at all times to discuss appliance problems with visitors.

Appliances represented in the two displays included: Gaffers & Sattler, Magic Chef, O'Keefe & Merritt, Roper, Tappan, Universal, and Wedgewood ranges; Electrolux refrigerators; Andrews, Blow Fire and Wedgewood space heaters; Fraser, Pacific, Payne, Royal Air Conditioning and Ward furnaces; Continental, Crane, Day & Night, General, Hoyt, Mission, M. P., Pittsburg, Ruud, Superbo, and Welsbach water heaters.

The Southern California Home Show, sponsored by the local Building Contractors Association and the Los Angeles Chamber of Commerce, was brought to a realization under the able management of the McDonald Brothers. Its admitted success was taken as an indication that the show will be staged as an annual event.

Small Homes in England Lack Central Heating

FRANK TAYLOR, noted British builder, who has been visiting the United States, believes that the differences between home building in England and in this country account for why there has been more low cost housing activity in England than here.

Mr. Taylor is chairman and managing director of Taylor Woodrow Estates, Ltd., of England, a firm which in the past ten years has built and sold more than 10,000 one- and two-family houses at an estimated value of \$27,500,000.

Summing up an interview with Mr. Taylor, the *New York Evening Post* reports that the popular new English dwelling sells at about \$2,750, but has no basement. Heat is supplied principally by fireplaces. Every room in a five- or six-room house, excepting the smallest bedroom and kitchen, has its own fireplace. Hot water is supplied from a small boiler in the kitchen which is heated by a small coal fire. In some of the houses a small boiler is concealed back of the living room fireplace and obtains its heat from the open fire.

The \$2,750 homes contain hallway, drawing room, dining room, kitchen, three bedrooms and one bath. Bathrooms are tiled, but not as colorfully as in this country. Bathroom and kitchen floors, however, are wood, and the covering is left to the home buyer. Bathroom fixtures are of the

enameled cast iron type, but they are white, not colored. Shower stalls are not included, a shower being placed over the bathtub and provision made for a curtain.

Kitchens and the smallest bedroom are heated by small electric or gas heaters. Gas cooking ranges are supplied by the builders, but they are not as elaborate as those in vogue in the new homes in America, being of the simple old gas stove type. Cabinets are provided by the builder. Also a portable zinc boiler for clothes washing. The kitchen sink has a small wooden drain board.

Most of the new English homes are of the semi-detached type and occupy plots about twenty or twenty-two feet wide and 150 feet deep, the garden being an important adjunct to the English home. The builder usually does no landscaping, leaving all planting to the buyer who uses his front garden for flowers and rear garden for vegetables. These lots, in a desirable location with good transportation, bring around \$250 to \$300 each.

Garages in England are separate from the house and cost about \$250 extra. They are approximately the same size as in this country, averaging 18 x 9.

Homes in England, however, are purchased for as little as 5 per cent in down payment and interest charges are only 4 1/2

per cent. Virtually all financing is arranged through the large building societies, similar to our savings and loan associations, but with extensive credit in the money markets.

Electric Cooking More Costly Than Gas

THE superiority of gas over electric cooking is further emphasized in an article on "Electric Ranges," published in *Consumers Union Reports* for April, 1938. After discussing efficiency, costs and performance of seven models of electric ranges, this significant statement is made:

"In most parts of the country cooking with electricity is unquestionably more expensive than cooking with gas. And greater care is needed to secure maximum economy of operation. The gas flame can be immediately adjusted to any desired height, whereas with the electric heater there are only three to five possible switch positions. Furthermore, the heat which the electric units absorb makes their response to adjustment slower, so that for maximum economy the switch must be turned a *little before** the change in heat output is desired."

* Italics theirs—Editor.

A. G. A. Meritorious Service Medal To Be Awarded

ANY gas company employee who has performed an act of heroism and self-sacrifice in saving life and property is eligible to receive the American Gas Association Meritorious Service Medal. This prized distinction will be awarded at the A. G. A. convention in Atlantic City, N. J., next October. The deed must have been performed during the period beginning July 1, 1937, and ending June 30, 1938.

The award is supported by an endowment in memory of Walter R. Addicks, late senior vice-president of the then Consolidated Gas Company of New York. It consists of a beautiful gold medal and button and a certificate. Specifically it is awarded for meritorious and conspicuous judgment, intelligence or bravery in saving human life either in the plant or works of any gas undertaking or having to do with the handling of the materials of manufacture or of the products manufactured or distributed. It is available to an employee of any manufactured gas company or natural gas company or manufacturer company member of the Association.

Applications for the 1938 Award should be sent to Association Headquarters on or before August 1, 1938. Forms for the application will be supplied upon request.

I am more than ever convinced that expenditure on research is one of the best forms of insurance for the future expansion of industry. Research is, in truth, the very foundation of our path of progress.—SIR DAVID MILNE-WATSON.

The Odorization of Natural Gas in the Southwest

PART II

The first part appeared in the May issue of the A. G. A. MONTHLY

BEFORE describing the general principles of the more popular and satisfactory methods of injection, consideration should be given to the principal factor influencing the design and operating requirements of the equipment.

How important is it that the malodorant be introduced in a uniform concentration at all times? The answer to this depends largely upon the economics of the situation. For large deliveries where the annual cost of the warning agent is enough to justify the necessary higher initial investment and closer operating attention, refined and accurate apparatus should be used to maintain a uniform concentration of odorant in the gas. Under such circumstances concentrations less than two gallons of Calodorant or one pound of Pentalarm per million cubic feet probably will give satisfactory results.

For smaller deliveries where the annual cost of the malodorant does not represent

By E. L. HENDERSON

Chief Engineer, United Gas Corp., Operating Division, Houston, Texas

an important item of operating expense, satisfactory results can be obtained if an *average* input of two gallons of Calodorant or one pound of Pentalarm per million cubic feet is maintained, even though the concentration may vary for short periods as much as from 25% to 250% of the average amounts.

Over-odorization to this extent does not seem to seriously increase customer

complaints after the initial period of odorization has passed. Under-odorization to this extent produces odor of gas readily detectable in gas-air mixtures of less than 1%. Actually considerable lag and blending seem to take place in a distribution system, tending to smooth out fluctuating concentrations at the point of introduction of the malodorant. There have been cases where gas has had a very perceptible odor several days after odorization had been discontinued. This condition can probably be attributed to the fact that the lines and accumulations of dust in them have

absorbed the stench sufficiently that a large amount of fresh, unodorized gas must pass before the odor disappears.

The apparatus in use in the Southwest today can be divided into two general groups: (1) equipment which injects the fluid into the gas stream, and (2) equipment in which the fluid vaporizes and the vapors are carried off by the gas.

Figure 1 illustrates the simplest drip type apparatus. Adjustment of the needle valve will deter-

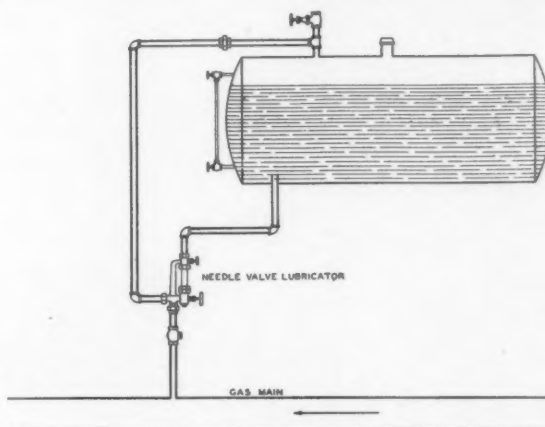


Figure 1. Drip type odorizer

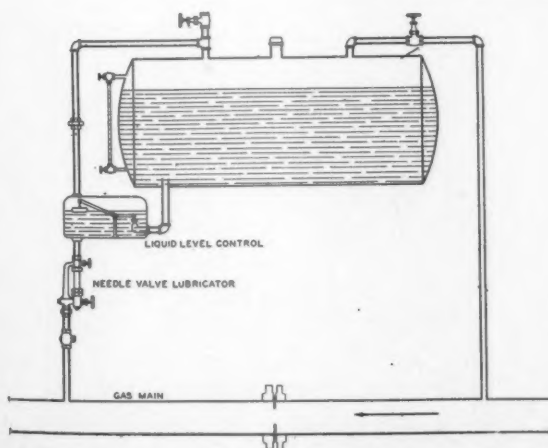


Figure 2. Drip type odorizer equipped with liquid level control

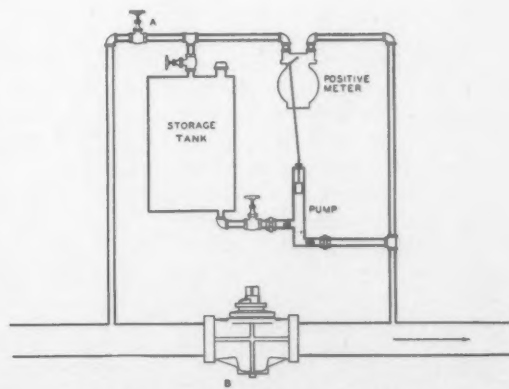


Figure 3. Positive injection type odorizer

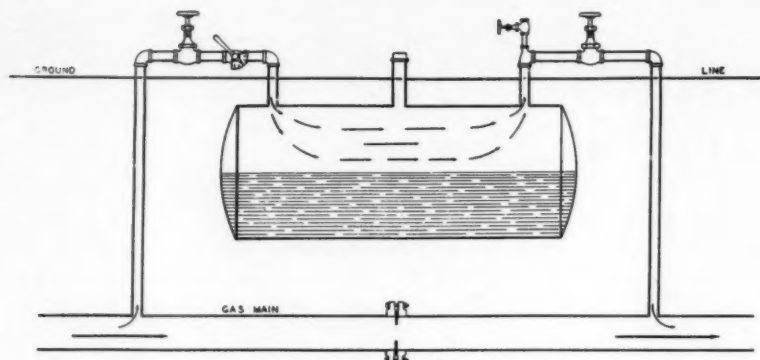


Figure 4. Proportional absorption type odorizer

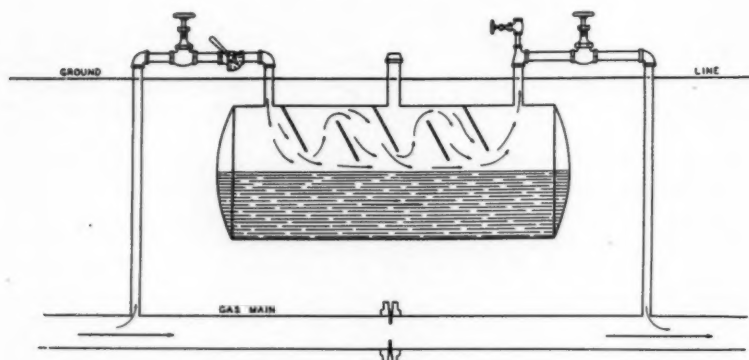


Figure 5. Proportional absorption type odorizer with baffles

mine the drops per minute or rate of input of the fluid. This method will maintain practically the same quantity of input per minute or per day regardless of the gas delivery. There will be some variation due to differences of liquid head in the tank. Some difficulty has been experienced with needle valves clogging from accumulations of foreign materials, thus requiring frequent inspection and cleaning. Temperature changes have been found in some cases to affect the needle valve settings due to expansion and contraction of the stems. This apparatus is satisfactory only on relatively large and uniform loads, or where frequent inspections and adjustments can conveniently be made.

Figure 2 shows the same odorizer equipped with a liquid level control which eliminates variance in input due to changes in liquid head. Here also the connections are made so that a differential pressure across the equipment is created by an orifice in the gas line. This type of odorizer has been devel-

ing a uniform concentration during varying loads, provided the static pressure of the flowing gas is held constant.

Figure 3 illustrates equipment which was developed and is being used by Mr. Clarke of the Coleman Gas & Oil Company at Coleman, Texas. It seems to have considerable merit. A portion of the gas is by-passed through a small positive displacement meter. With unchanged valve settings, an equal proportion of the total gas flow will pass through the small meter during wide variations of the total gas delivery. For every revolution of small meter a definite quantity of fluid is injected into the main gas stream by means of the little pump which is driven by the index shaft of the meter. The valves at "A" and "B" are adjusted so that the proportion of the gas passing through the by-pass will operate the pump at the correct speed to insure the desired concentration of odorant in the gas.

The types of equipment which have just been described comprise the methods in use for dripping or injecting fluid into the gas stream. Other equipment in use belongs to the second gen-

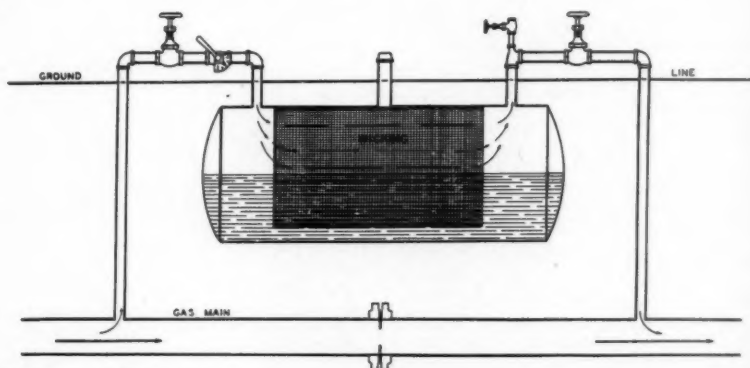


Figure 6. Proportional absorption type odorizer with wicking

oped and improved so that by proper adjustment the fluid input will continue in a predetermined proportion to the gas flow, thus maintain-

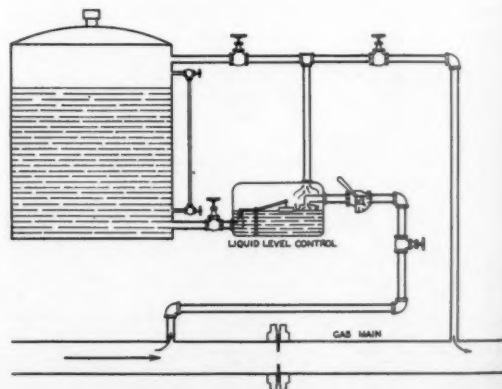


Figure 7. Proportional absorption type odorizer with liquid level control

eral group, commonly referred to as absorption type odorizers. The warning agents in use have the capacity of vaporizing in quantities considerably in excess of what is needed for proper odorization. Therefore it is the general practice to treat only a proportional part of the gas delivery, so that the resulting total will have the desired concentration.

Figure 4 illustrates one of the simpler installations. This device is installed so that by proper adjustment of the precision valve in the by-pass line, a correct proportion of the gas passes through the tank partially filled with the fluid. At ordinary temperatures and pressures a very small percentage of the total is by-passed.

For convenience in refilling or gauging the tank, other valves are provided for shutting gas off from the tank without disturbing the setting of the precision valve. Various means are employed to create a differential pressure across the tank. An orifice plate or gate valve can be used as well as a pitot tube arrangement at each inlet and outlet connection. In fact, the quantity by-passed is so small that in many cases simple full-flow connections without a restriction between them have been found to give reasonably good performance.

More uniform absorption of the vapor takes place if some means is provided for agitation or a more intimate contact of the gas with the liquid. Figure 5 illustrates this same equipment provided with baffles to

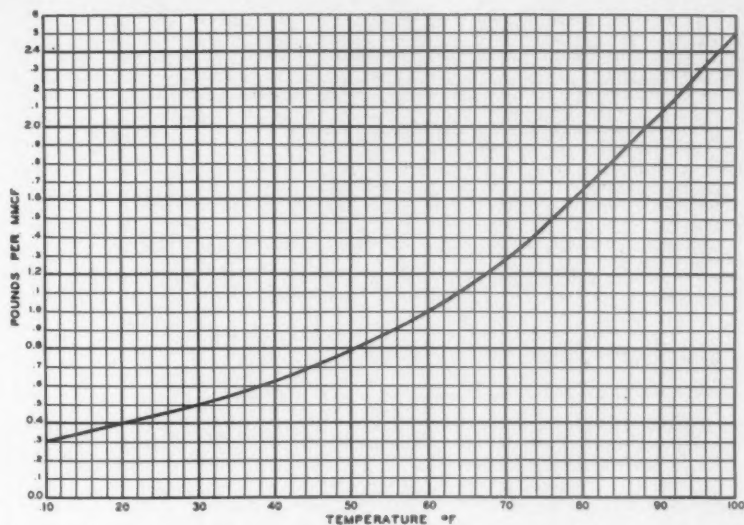


Figure 9. Effect of temperature on rate of absorption in proportional type odorizers—Pentalarm

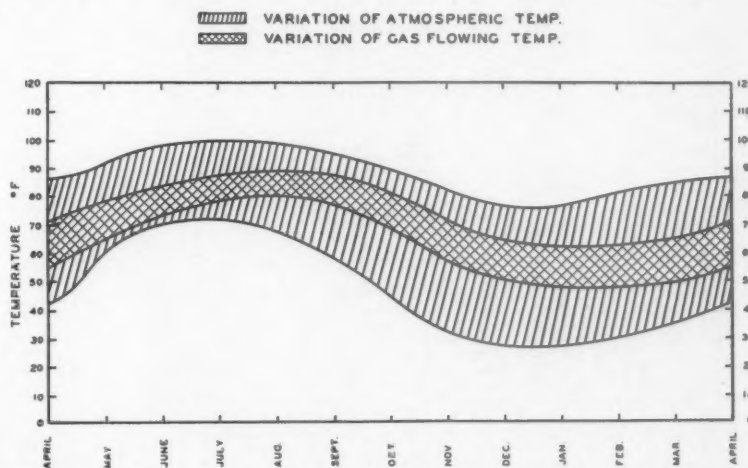


Figure 10. Comparison of atmospheric and gas flowing temperatures (Gulf Coast area)

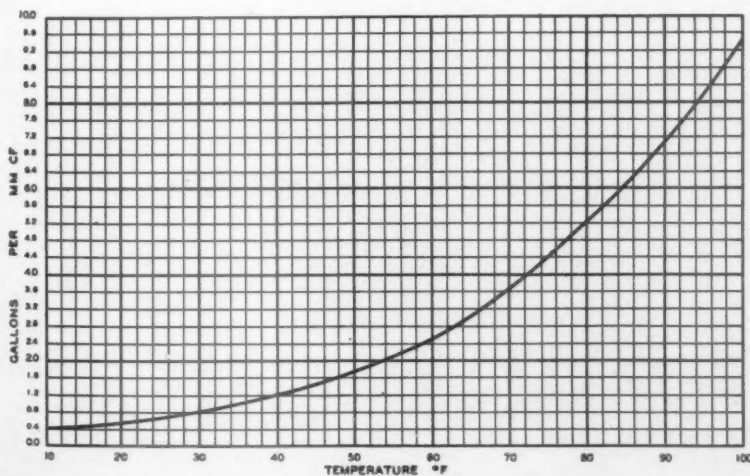


Figure 8. Effect of temperature on rate of absorption in proportional type odorizers—Calodorant

produce an agitation resulting in a better mixing of the gas with the vapor.

Figure 6 illustrates the use of wicking in this type of odorizer to provide a more intimate contact between the gas and the fluid.

Figure 7 employs the same principle as the other simpler types except that the evaporation takes place in a chamber containing only a small amount of fluid. The purpose of this is to eliminate difficulties arising from the boiling off of the lighter fractions first, leaving a heavier residue with less volatility as the supply of fluid in the tank approaches a lower level. There is considerable difference of opinion as to the extent to which this

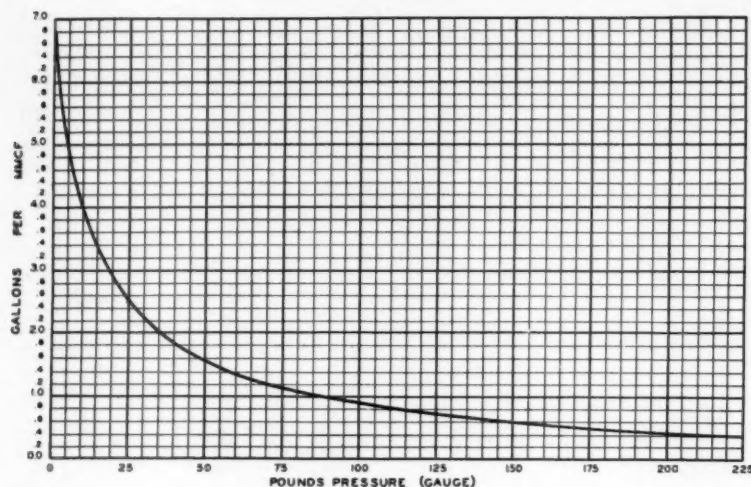


Figure 11. Effect of pressure on rate of absorption in proportional type odorizers—Calodorant

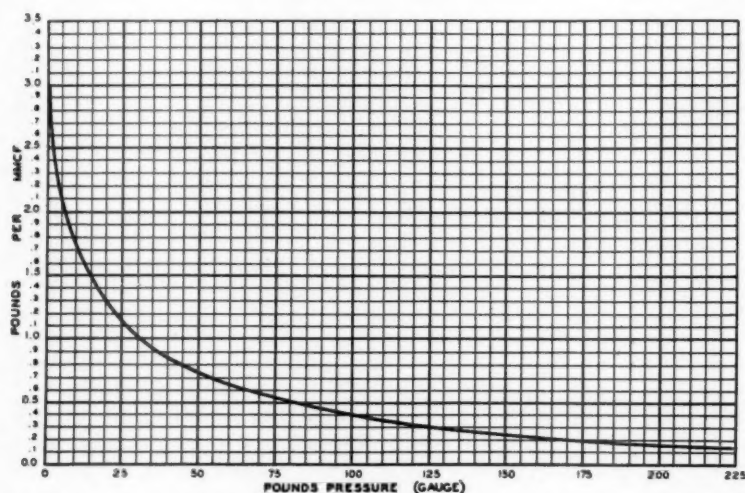


Figure 12. Effect of pressure on rate of absorption in proportional type odorizers—Pentalarm

takes place. The liquid level control in the small evaporating chamber provides a means of feeding in new fluid from the storage tank. In this small chamber a condition of vapor phase balance is reached, so that new fluid enters and evaporates with the residue in balance remaining unchanged as to gravity or constituency.

A failure of the liquid level control in this type of apparatus will result in the by-passed gas either being sealed off or carrying excessive quantities of fluid into the gas stream. One company provides an overflow chamber large enough to hold the entire supply from the storage tank, as a safeguard in case of failure of the liquid level control.

It has been the practice of most companies to adjust for the proper proportion of by-passed gas by the cut-and-try method. Mr. Whitis, of the West Texas Gas Company, has developed a means of obtaining an accurate adjustment with one setting of the valves. His method was described in an article which appeared in *Gas* magazine for January, 1938.

A very important factor in the operation of the absorption type

equipment is the effect of the static pressure of the gas and its temperature upon the volatility of the malodorants. Figure 8 is a chart showing the effect of temperature upon the rate of absorption in proportional type odorizers when Calodorant is used. This shows that with the static pressure remaining constant and the valves so adjusted that the total gas is being odorized at the rate of $2\frac{1}{2}$ gallons per million cubic feet at 60° F., the concentration will change to 0.8 gallon per million cubic feet if the temperature drops to 30° F., or will be 5.2 gallons per million cubic feet at 80° F.

Figure 9 shows similar information regarding Pentalarm. Temperature affects the evaporation of this material also to a considerable degree. For instance, if the odorizer is adjusted for a concentration of one pound of Pentalarm per million cubic feet at 60° F., and the temperature drops to 30° F., the concentration will change to 0.5 pound per million cubic feet; or will be two pounds per million cubic feet at 88° F.

Figure 10 shows a comparison of the average atmospheric and gas flowing or ground temperatures encountered in the Gulf Coast area. Each bank on the chart represents the spread between the maximum and minimum temperatures encountered throughout the year.

When the odorizing equipment is placed under ground, the temperature differences are much less when placed above ground and subjected to atmospheric temperature. For this reason the above ground equipment is not nearly so desirable as the under

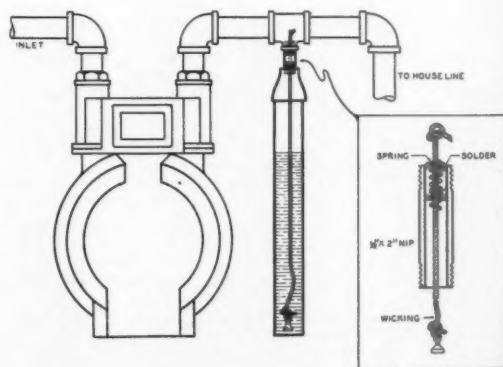


Figure 13. Individual odorizer

ground type unless some means of auxiliary temperature control is employed. The simpler absorber, similar to the one shown in Figure 5, can be buried completely and its advantage in the matter of temperature control probably offsets any disadvantage due to unequal absorption rates caused by lowering of the fluid level and changes in the composition of the fluid resulting therefrom.

The apparatus with the small evaporating chamber equipped with liquid level controls and similar equipment requires considerable attention and maintenance, and must of necessity be installed above ground. Mr. Green of the Arkansas Power & Light Company is using equipment installed above ground, with the temperature of the evaporating chamber thermostatically controlled by means of an electrical heating unit. The Lone Star Gas Company uses steam introduced into an outer jacket of the absorber to insure a constant temperature on their large absorption type stations, in some cases using steam from adjacent gasoline plants and in other cases using steam generated in a small boiler used solely in connection with the odorizer.

Effect of Pressure Changes

Figure 11 shows the effect on the volatility of Calodorant in absorption type equipment produced by changes in static pressure of the gas with a fixed adjustment of the valves and a constant temperature. Figure 12 shows similar information for Pentalarm.

The simplest method of providing against variation in concentration due to changes in static pressure is to install the odorizing apparatus at a point where a constant pressure can be maintained by regulation of the gas in the transmission or distribution lines. It should not be necessary to provide in the odorizing equipment itself any means of compensating for variations in static pressure.

Figure 13 illustrates the type of equipment used in the Southwest to odorize the gas used by an individual domestic customer. The pot holds about one pint of fluid and by capillary action the wick carries the malodorant into the gas stream at the outlet of the customer's meter. This equipment has a tendency to over-odorize the gas but seems to be the

simplest solution to the problem of treating the gas for individual customers.

Reports on the operation of this equipment indicate that it should be serviced about twice a year. Our experience indicates that the best method is to take a complete unit, filled with fluid, to the premises and install it in place of the old equipment. The old odorizer is then returned to the shop, cleaned, refilled, and made ready for replacement at another location.

Field Experience

Where this device is used on gas containing dust there seems to be a tendency for a gummy crust to form on the wick which reduces its efficiency. This same difficulty can probably be anticipated in all types of odorizers using wicking, unless the gas is free of dust.

Some operators report that there seems to be no tendency toward weakness of odor as the liquid in the container is used up. Others report that the odor does seem to become weaker. In no case have we been advised of failure of this device to odorize the gas satisfactorily as long as the liquid in the tank is in contact with the wick.

It has been discovered that the rate of evaporation can be controlled to a considerable extent by variation in the amount of exposed wick in the gas stream. If the containers are serviced

twice a year, more wick should be exposed to the gas during the winter months than during the warmer summer period when a higher rate of evaporation takes place.

Considering that continuous odorization is a practice less than ten years old, no apologies seem necessary for the progress to date.

There is still a need for improvement in equipment, and further research into the properties of the malodorants, particularly as to their tendency toward fractionation.

Natural Gas Found in Scotland

DURING exploration work carried out for the Anglo-Iranian Oil Company in drilling for oil in Great Britain, natural gas in considerable quantities has been struck in a test well situated near Dalkeith and about seven miles southeast of Edinburgh.

The gas was encountered in sandstones of the oil shale group extending from a depth of 1,581 ft. to 1,640 ft. from the surface, and short tests of the upper and lower sections have proved an initial production of some 4,000,000 cu.ft. per day.

The intermediate sections of the zone have not yet been tested, but these are also potentially productive. No indication can yet be given as to the life of the flow.

The well has now been drilled to a depth of 1,650 ft. and will be carried down to the base of the oil shale group of the lower carboniferous formation which is anticipated will be about 3,000 ft. from the surface. (*The Gas Times*—April 30, 1938.)

Gas Dramatized in Preview



An heroic "Edison Man" in a scarlet coat trimmed with gold, represents gas service in one of the four floats presented by the Consolidated Edison Co. of New York in the preview motorcade of the New York World's Fair, April 30

Factors Influencing the Gas Consumption of Storage Water Heaters



Paul L. Betz

IN an earlier paper on water heaters¹ the author showed that the monthly gas consumption of storage water heaters may be calculated for service conditions by making use of certain constants

of the water heater itself and the conditions under which the heater operates. For convenience, equation (6) of that paper is repeated below:

(6) Daily B.t.u. input to water heater

$$= \frac{8.33 G t_1}{e'_{ut}} + \left(24 - \frac{8.33 G t_1}{e'_{ut} q} \right) (8.33 V S t_2)$$

where G = daily hot water consumption, gals.

t_1 = temperature difference between outlet and inlet water.

e'_{ut} = effective thermal efficiency at which water is heated (uncorrected for heat losses) expressed as a decimal. (NOTE: This efficiency differs from the value of e_{ut} determined by the A. G. A. method, and is fully discussed in the original article.²)

q = manufacturer's input rating of burner, B.t.u. per hr.

V = volume of tank, gals.

S = standby loss (expressed as a decimal and based on hourly heat loss from stored water, above room temperature).

t_2 = temperature difference between stored water and room.

Referring to equation (6), it will be seen that the first term on the right hand side,

$$\frac{8.33 G t_1}{e'_{ut}}$$

gives the B.t.u. input to the heater necessary to provide the daily hot water load of G gallons. The only losses included in this term are those due to inefficiency of the system in transferring the heat available in the gas to the water in the tank. Therefore, in

By PAUL L. BETZ

Consolidated Gas Electric Light and Power Company of Baltimore

regard to the first term in equation (6) improved effective thermal efficiency is the only means for reducing this component of the total B.t.u. input to the heater.

The second term on the right hand side of equation (6),

$$\left(24 - \frac{8.33 G t_1}{e'_{ut} q} \right) (8.33 V S t_2)$$

gives the daily B.t.u. input to the heater necessary to supply the heat losses occasioned by storing the hot water awaiting use. Examination of this term reveals that there are four factors relating to the design of the water heater that influence the B.t.u. input to the heater needed to meet a given set of conditions. They are the effective thermal efficiency, e'_{ut} ; the manufacturer's hourly B.t.u. input rating of the burner, q ; the volume of the tank, V ; and the standby loss, S . Consideration of the first term of equation (6) in the paragraph above has shown that the effective thermal efficiency, e'_{ut} , should be as high as possible. This conclusion is valid in the face of the apparent contradiction of the second term wherein e'_{ut} appears in the denominator, due to the fact that under actual load conditions the first term is of greater importance than the second term.

Before discussing the remaining factors— q , V and S —it is necessary to inject a note of caution. Already we have seen that increasing the effective thermal efficiency, in the first term results in decreased B.t.u. input; and in the second term results in increased B.t.u. input. Actually the factors e'_{ut} , q and S are not always independent of each other. For example, increasing the effective thermal efficiency may be accomplished by increasing the heating surface of the water heater, but during the standby period this en-

larged heating surface becomes an enlarged cooling surface and increases the standby losses. On the other hand, the dependency of the standby losses upon the thermal efficiency may be reduced or eliminated in the above example by the use of a damper or flue construction that reduces or prevents flue losses during the standby period. And so it is, in our efforts to improve water heater performance, we must always think in terms of the whole and not make an improvement in one direction without knowing the full effect produced in other directions.

With this word of caution let us consider the remaining factors— q , V and S . Reference to the second term of equation (6) indicates that reduced B.t.u. input is occasioned by reducing the input rating of the burner, q . Therefore, as low a B.t.u. input should be used on the burner as is consistent with satisfactory service to the user. Further, the tank volume, V , should be as small as will meet satisfactorily the conditions imposed by the user. More may be said about q and V , but not in this article, as the present purpose is to discuss several of the factors that influence the standby loss, S , the remaining term of equation (6).

It is proposed to explore some of the possibilities that exist for reducing the standby losses. Experiments are described which show the effect of using an automatic damper in the flue, of using improved thermal insulation and base insulation, and the elimination of the constantly burning gas pilot. The contribution of the pilot flame to the maintenance of the temperature of the stored water is determined.

1. Method of Test

A departure was made from the usual method of determining standby losses in that the gas consumption for standby operation was determined in a manner that the results are not appreciably affected by changes in room

¹ "Calculation of Gas Consumption of Storage Water Heaters Under Service Conditions," Paul L. Betz, A. G. A. MONTHLY, Dec., 1937, p. 417.

temperature. Two similar automatic storage water heaters were used and were installed side by side, each having its own test meter and flue. On one heater the various improvements were applied while the other was not altered and served as a control against which the performance of the first heater could be compared. Variations in room temperature affected both heaters similarly, and any difference in gas consumption for standby operation of the heaters was therefore due to the test condition imposed on the one heater. Each test lasted for a period of 6 or 7 days during which time a recording thermometer was used to measure room temperature.

Similar Heaters Used

Two similar 20-gallon storage water heaters of a well-known make were used in the experiments. The heaters were of the single internal flue type, having an input rating of 20,000 B.t.u. per hour. The heaters were insulated on the top and sides with 4-ply asbestos air-cell insulation having a thickness of one inch. Mixed city gas was used having a heat of combustion of 500 B.t.u. per cubic foot.

The thermostat used on the heaters was of the snap-acting, bimetallic disc type. It was found that with these thermostats, it was impossible to make the two heaters operate at exactly the same upper and lower temperature limits. Accordingly, the thermostats were rendered inoperative by removing the valve member, and the heaters were controlled by a Leeds and Northrup potentiometer type controller and recorder which operated a solenoid type valve installed in the gas supply to each water heater. Iron-constantan thermocouples were inserted in the tank of each heater with their hot junctions at the level of the regular thermostat.

The thermocouples were placed inside copper tubes which were sealed at their lower ends and inserted into the tanks. A small quantity of oil was placed in each tube so that the heat from the water was conducted to the thermocouple junction. The potentiometer controller was adjusted to operate the two water heaters in a manner that simulated operation by the regular thermostats, the operation of

TABLE I
AUTOMATIC DAMPER IN FLUE PIPE BETWEEN HEATER AND DRAFT DIVERTER

Test No.	Test Conditions	Duration of Test Days	Aver. Room Temp. ° F.	Standby Gas Consumption Cu.Ft. Per Month		Difference in Standby Consumption Based on Heater No. 1 Per Cent.
				Heater No. 1	Heater No. 2	
A8	Heaters No. 1 and No. 2 Standard	6	80.6	1350	1415	4.8+
A9	Heater No. 1—Standard, Heater No. 2—Damper	7	78.9	1424	1110	22.0—
A10	Heaters No. 1 and No. 2 Standard	7	74.3	1562	1645	5.3+

the burners being discontinued when the water temperature at the outlet reached 140° F. and initiated when the water temperature had fallen to 130° F. Tests made after adjusting the controller indicated that the two heaters operated similarly and check tests made during progress of the work indicated that this adjustment was maintained.

II. Experimental

A. DAMPER IN FLUE PIPE

In this test an automatic damper was installed in the flue pipe of one of the water heaters between the heater and the draft diverter. The control heater was standard in every respect. Both heaters were operated on standby for a period of one week.

The data are given in Table I in which test A9 indicates a 22 per cent reduction in gas consumption for the heater equipped with the flue damper. Tests made both before and after the above test (A8 and A10) indicate that when both heaters were operated under the same test conditions, that is, both heaters standard in all respects, heater No. 2 had a standby consumption which was approximately 5 per cent higher than that of heater No. 1. In test A9, the standby consumption of heater No. 2 was 22 per cent lower than that of heater No. 1. Therefore, the effect of using a damper in the flue is to reduce standby losses by approximately 27 per cent.

B. EXTRA INSULATION—ONE INCH OF ROCK WOOL

In this experiment one of the heaters was provided with additional insulation consisting of a rock wool blanket one inch thick. The insulation was applied to the top and sides

of the water heater. Data of the same type as in Table I were obtained with the result that the heater equipped with one inch of rock wool insulation in addition to the regular air cell insulation had its standby consumption reduced 25.3 per cent, this value being corrected for the difference in performance when both heaters were operated under similar conditions and were standard in every respect.

C. EXTRA INSULATION—TWO INCHES OF ROCK WOOL

A two-inch rock wool blanket insulation was applied over the usual insulation and a standby test was made. The results of the test indicate a reduction of standby consumption of 30 per cent. This value is adjusted to put the operating characteristics of the two heaters on the same basis.

The above indicates that standby consumption may be reduced 25.3 per cent by the use of a 1-inch rock wool blanket in addition to the usual 1-inch, 4-ply, asbestos air-cell insulation originally provided. Also, the use of a 2-inch rock wool blanket, in addition to the usual insulation, reduces standby consumption 30 per cent. Reference to data on the thermal conductivity of various insulating materials indicates that a 1-inch thickness of 4-ply air-cell is approximately equivalent to one-half inch of rock wool. Therefore, the above composite insulations are equivalent to approximately 1.5 and 2.5 inches of rock wool, respectively.

D. BASE INSULATION

In the water heaters used in these experiments, the air-cell insulation around the tank is extended so as to cover the walls of the burner com-

partment. However, the base of the burner compartment is not insulated and is made of thin sheet metal, which is attached so that air may enter to supply the burner.

A sheet metal cylinder was placed vertically around the base of one of the water heaters and extended from the floor to the level of the sheet metal bottom of the combustion chamber. The cylinder was then filled with loose rock wool to an average thickness of two inches, leaving two inches between the surface of the insulation and the base of the burner.

Standby tests indicate a reduction in fuel consumption of 7.5 per cent for the heater so insulated at the base. This value is corrected for the difference in performance of the two heaters when they are operated under similar conditions.

E. CONTRIBUTION OF PILOT FLAME TO WATER TEMPERATURE

The contribution of the pilot flame toward maintaining the temperature of the stored water was determined from an experiment in which one of the water heaters was equipped with an electric ignition device which supplanted the usual gas pilot flame.

With this arrangement, when the thermostat (Leeds and Northrup potentiometer controller) called for heat, an electrically operated gas valve was energized and the electric ignition means was operated to light the burner. This resulted in supplying heat to the water only during operation of the main burner. The control heater, which was a standard heater, was equipped with the usual gas pilot which supplied heat to the water not only during operation of the main burner, but during idle periods also.

Data are given in Table II from which may be calculated the efficiency of the pilot flame relative to the main burner flame.

From Test B1, Table II:

Gas consumption of heater No. 2 = 1670 cu.ft./month.

Pilot gas consumption of heater No. 2, at 1.25 cu.ft./hour = 900 cu.ft./mo.

Main burner consumption of heater No. 2 = 1670 — 900 = 770 cu.ft./month.

Main burner consumption of heater No. 1 = 1282 cu.ft./month.

From Tests B1, A8 and A10, Table II:

Corrected main burner consumption of heater No. 1 = $1282 + \left(\frac{.046 + .050}{2} \right)$

$1670 = 1282 + 80 = 1362$ cu.ft./month.

Therefore:

Pilot consumption of heater No. 2 effective in maintaining water temperature = $1362 - 770 = 592$ cu.ft./month.

Therefore, the burning of 900 cu.ft. of gas at the pilot of heater No. 2 gave the heating effect equivalent to the burning of 592 cu.ft. of gas at the main burner of heater No. 1.

Portion of pilot consumption effective in maintaining water temperature = $\frac{592}{900}$

$\times 100 = 65.7$ per cent.

Or efficiency of pilot burner = $0.657 \times$ (efficiency of main burner).

F. ELIMINATION OF GAS PILOT

The data given in Section E may be used to determine the effect on the standby consumption of eliminating the gas pilot. Of course, such a step entails the use of equipment not at present in general use on gas burning appliances, but eliminating the gas pilot should not be overlooked as a means of decreasing standby consumption.

Referring to Section E, we find

Corrected main burner consumption of heater No. 1 = 1362 cu.ft./month.
Gas consumption of heater No. 2 = 1670 cu.ft./month.

In this test, heater No. 1 employed an electric pilot device, and heater No. 2 used the ordinary gas pilot.

Therefore,

Reduction in standby consumption due to eliminating gas pilot by use of electric pilot = $\left(\frac{1670 - 1362}{1670} \right) \times 100$

$$= \frac{308}{1670} \times 100$$

$$= 18.4 \text{ per cent}$$

As noted above, the electric pilot device is de-energized during periods when the main burner is inoperative. The electricity consumption for this system is not excessive, being approximately one kw.hr. per 1000 cu.ft. of gas used.

G. SUMMARY

The results of the experiments on the water heaters described in this article may be summarized as follows:

- Standby gas consumption is reduced 27 per cent by the use of an automatic damper in the flue between the heater and draft diverter.
- Effect of increased insulation.
 - One inch of rock wool insulation in addition to the regular insulation of one inch of 4-ply asbestos air-cell (the total being equivalent to 1.5 inches of rock wool insulation) results in a reduction in standby gas consumption of approximately 25 per cent.
 - Two inches of rock wool insulation over the regular one inch layer of 4-ply asbestos air cell insulation (the total being equivalent to 2.5 inches of rock wool insulation) reduces the standby gas consumption approximately 30 per cent.
- Two inches of rock wool insulation at the base of the combustion chamber reduces standby gas consumption 7.5 per cent.
- The efficiency of the pilot burner is 65.7 per cent of that of the main burner during standby operation for the heaters used in the experiment. The pilot rate was 1.25 cu.ft. per hour.
- Elimination of the constantly burning gas pilot results in a decrease in standby gas consumption of approximately 18 per cent.

II. Appendix

SERVICE EFFICIENCY

In the article by the writer referred to in footnote 1, a general formula is

(Continued on page 239)

TABLE II
PILOT RATE, HEATER NO. 2 = 1.25 CU.FT. PER HOUR

Test No.	Test Conditions	Duration of Test Days	Aver. Room Temp. ° F.	Standby Gas Consumption Cu.Ft. Per Month		Difference in Standby Consumption Based on Heater No. 2 Per Cent.
				Heater No. 1	Heater No. 2	
B1	Heater No. 1—Electric Ignition, Heater No. 2—Standard	7	71.6	1282	1670	—
A8	Heaters No. 1 and No. 2 Standard	6	80.6	1350	1415	4.6
A10	Heaters No. 1 and No. 2 Standard	7	74.3	1562	1645	5.0

"Comfort Heating"—A New Aid to the Gas Heating Salesman

By C. GEORGE SEGELER

American Gas Association

MORE than one committee meeting struggled with the choice of a name which would be inclusive and descriptive of heating as well as air conditioning. Finally, the term "Comfort Heating" was chosen. First to make use of this descriptive title will be a new book designed especially for the heating salesman who needs technical information in a form ready for use and simple to apply.

The continuance of the successful progress of gas for comfort heating depends in no small measure on the easy and general availability of information regarding the proper selection, estimation and design of heating and air conditioning systems. Every salesman, whether he is connected with a utility company or with a dealer, as well as every architect and builder who has plans to use gas for heating, needs some practical, simple method to pick his equipment and to calculate the probable operating cost.

Information on competitive fuels is equally vital in order to provide authentic and accurate grounds on which to recommend gas. The customer wants to be shown facts and figures from an unbiased source upon which he can rely.

Prepared by Experts

The Committee on the Engineering Handbook announces with pleasure the book, "Comfort Heating," which this group of ten experts has prepared for the benefit of all engaged in gas heating. No effort has been spared to make the book worthy of inclusion in every salesman's kit. Format, typography and even the paper selected are designed to be in keeping with the dignity and importance of those selling gas heat.

It may seem strange to discuss the mechanics of a book rather than its content, but the committee felt that all too little attention was paid to the question of salesman's material and sales presentation methods. The use of this new book will go a long way toward improving presentations and making field books and field estimates more valuable and more accurate.

"Comfort Heating" makes use of a new paper material, an unusually strong, tough, white Kraft paper. The pages are bound with a plastic comb, but this can be pulled out very readily, leaving the book and covers ready for insertion in any standard three-ring binder if so desired. This arrangement gives the book an exceptional versatility as far as its physical use is concerned. In the three-ring binder, extra pages may be added and catalogue sheets incorporated at appropriate places.

The book has eighty-four pages and is divided into nine chapters including the following:

DETERMINATION OF HEAT LOSS FROM BUILDINGS
STEAM AND HOT WATER HEATING
WINTER AIR CONDITIONING
SELECTING GAS HEATING EQUIPMENT
ESTIMATING GAS HEATING COST
DATA ON COMPETITIVE FUELS
DOMESTIC WATER HEATING
SUMMER AIR CONDITIONING
PHYSICAL UNITS AND TABLES—MISCELLANEOUS INFORMATION

The text introduces several innovations which are worthy of careful study because they simplify the work of the salesman. In Chapter I, the heat transmission tables, based on The Guide of the American Society of Heating and Ventilating Engineers, have been simplified to two decimal places. The values, differing from one another by not more than 2%, have been lumped together and the coefficient for insulated frame houses using rock wool has been raised to a uniform level of .1.

Experience Dictates Changes

This change from the published figures in The Guide is the result of experiences reported by house heating engineers in many parts of the country in reference to the proper coefficients to employ in practice. The field reports have also been confirmed by tests performed by Professor Gordon B. Wilkes at Massachusetts Institute of Technology. Any inaccuracies which may have been introduced in this matter are far less than general errors in a house heating heat loss survey and, consequently, can well be disregarded.

In Chapter IV, the tables for selecting gas heating equipment, which were described briefly in an article in the A. G. A. MONTHLY, April, 1938, page 138, are given in full. These tables are expected to make the work of all heating salesmen not only easier but more consistent. It is hoped that the suggested values will find wide acceptance throughout the gas heating industry.

These tables will eliminate confusion which exists in the minds of so many salesmen, especially those new to gas heating regarding the meaning of the A. G. A. boiler ratings. The tables are designed to obviate this confusion and to make it possible to select the correct boiler once the hourly heat loss or the installed radiation in the house is known. From that point on, either a boiler, furnace, or burner can be selected properly by inspection of the table.

As these lines are written an example comes to hand. One of the large mail

order houses has just entered the gas boiler business and is selling a gas boiler made by a well-known manufacturer. The salesmen of the mail order house, however, were recruited from the heating industry and did not seem to be familiar with the meaning of the A. G. A. ratings and insisted that the output rating stated on the label of the boiler was the actual connected load which the boiler could handle. The new book, "Comfort Heating," would certainly solve their problem most easily.

A very useful chapter is the one dealing with competitive fuels. This covers the competitive situation of coal burners (hand-fired and stoker), as well as the oil burner.

Water Heating Covered

There is a chapter devoted to domestic water heating by gas. This has been included since practically every gas house heating installation is accompanied by an automatic gas storage water heating installation as well, and in many instances, the same salesman handles the combined sale. The two final chapters in the book are respectively devoted to summer air conditioning by gas and to a chapter on the physical units and tables which are needed in house heating work. The subject of flues is extensively covered in this final chapter.

The new book "Comfort Heating" is thus specifically designed for the house heating salesman whether connected with a utility or an independent dealer. Even at first glance, the existence of many tables simplifying the house heating engineering work is apparent.

PRICE OF BOOK "COMFORT HEATING"

Single copies	\$2.00 each f.o.b. N. Y.
10 copies	1.90 each
20 copies	1.75 each
30 copies	1.50 each
50 copies	1.25 each
100 copies	1.00 each

Servel Establishes New Safety Record

AN outstanding industrial safety record has just been established at the plant of Servel, Inc., in Evansville, Ind., which has reported 227 continuous working days without a lost time accident, according to an announcement made by Louis Ruthenburg, president. The record includes more than 4,000,000 man hours worked by Servel employees since the last lost time accident occurred on Sept. 16, 1937. Servel, Inc., is the manufacturer of the Electrolux gas-operated refrigerator.

New Book Gives History of the Gas Industry

A STORY of the manufactured and natural gas industry is told in a 500-page illustrated volume by Louis Stotz, published in May. In 34 chapters of non-technical, easy-to-read prose it covers the romantic background of the gas business and its developments in an interesting manner. It is a useful contribution to the literature of the industry.

The author and publisher, Mr. Stotz, has spent the greater part of his life in the gas industry and is well equipped to write about it. For many years he was connected with the headquarters staff of the American Gas Association and one of its predecessors, the National Commercial Gas Association.

While a large part of the early history of the industry is naturally devoted to manufactured gas, the natural gas industry receives extended comment in the new book. Historical sketches and up-to-date maps of 12 major pipe line systems are included.

One section contains a complete resumé of the regulation of public utilities. Other subjects explored are the evolution in sales promotional, publicity and merchandising methods, the trend in rate structures and their influence on load building and sales,

and the history of the many domestic, commercial and industrial uses of gas. Competitive factors are also discussed, as are the importance of the holding company and the change-over from manufactured to natural gas. Even a glimpse of the future is undertaken.

For those who desire a good background of easily digested factual information on the gas industry, the book should have strong appeal. It should find a well-deserved place in the libraries of all gas companies, executives and any employees who are interested in improving their knowledge of the industry. It is suggested that gas company managements inform the members of their organizations that the book is available.

Outside of gas company circles the book may serve a useful purpose. It is written so that business men and the general public will have a better understanding of the gas business. To make it available for wide general reading, gas companies might arrange to donate copies to the public, school libraries, financial institutions, civic bodies and other institutions.

Orders for the book should be placed directly with Louis Stotz, Room 550, 420 Lexington Ave., New York, N. Y. The price is \$3.50 for single copies; \$3.00 each for ten or more.

Small Home Market for Gas Heating

A HIGH percentage of gas house heating sales by companies actively engaged in this type of promotion were made to newly constructed homes, it was disclosed in a recent survey. This was brought out by H. G. Schaul, Westchester Lighting Co., Mt. Vernon, N. Y., speaking before the annual convention of the Pennsylvania Gas Association, May 5.

Mr. Schaul stated that "many of these homes range from four to six rooms and were independently heated in the majority of cases with a small central-fired gas warm air furnace. This furnace provided even temperatures, automatically controlled throughout the day and gave the home owner clean, humidified warm air in the winter. The same furnace was used in the summer time to circulate cool clean air throughout the home.

"In addition, the survey disclosed that the gas companies employing special trained men to contact architects, builders and realtors in new house construction, showed the highest percentage of sales resulting from their efforts."

Gas Range Improvements Noted in Article

FEATURES of gas burners, ovens and broilers are described with approval in an article entitled, "Range Finder," which appears in the June issue of *House and Garden*. A two-page spread of close-up sketches is devoted to pointing out the numerous technical improvements in modern automatic gas ranges.

"Judging by appearances," the article states, "today's gas ranges are obviously a new high in modern appliances. Judging by the facts and figures of laboratory tests, they are every bit as good as they seem. This improved performance is the result of careful engineering in the basic principles and the use of new materials for insulation and other vital parts that never meet the eye."

Mention is made of the new back-ledge construction, faster top burners and ovens, automatic oven lighting, dependable clock controls, smokeless broiling, divided cooking top, and other good reasons for cooking on a gas range.

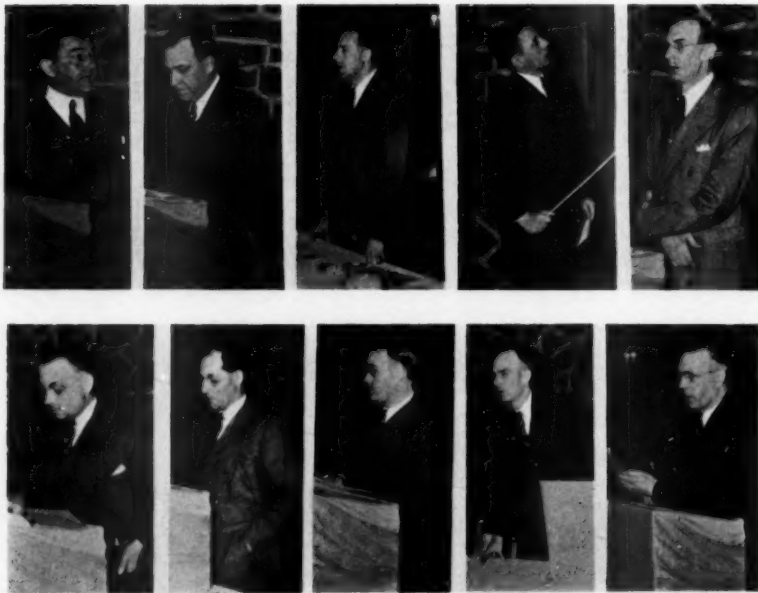
Reprints of the article have been made available to the gas industry.

"Big Apple" and Gas Range

WHY is a gas range like the "Big Apple?" Edwin C. Hill, well-known news commentator, supplied the answer when he wrote in one of his recent columns:

"Some dances get hot slowly like electric cook stoves and concert violinists, but the 'Big Apple' is like a gas stove or a temperamental opera singer—it bursts into immediate flame."

Gas Operating Experts Meet



King Photos

Action pictures of speakers at the meeting of the gas operating group, Empire State Gas and Electric Association, April 22, held at the recreation center of the Central Hudson Gas & Electric Corp., near Rifton, N. Y. Top row, left to right: E. P. Prezzano, Westchester Lighting Co.; F. R. Coster, Westchester Lighting Co.; Ernest R. Acker, Central Hudson Gas & Electric Corp.; F. J. Plinke, Rochester Gas & Electric Corp.; R. M. Kellogg, Consolidated Edison Co. of N. Y. Bottom row: S. S. Tomkins, Consolidated Edison Co. of N. Y.; H. L. Strong, N. Y. State Electric & Gas Corp.; H. C. Harding, Westchester Lighting Co.; R. Van Vliet, New York & Richmond Gas Co.; H. A. Anderson, Syracuse Lighting Co.

Personal and Otherwise

Harper Wins Walton Clark Medal



R. B. Harper

THE Walton Clark Gold Medal, awarded by The Franklin Institute to the "author of the most notable advance in knowledge or improvement in apparatus, or in method concerning the science or art of gas manufacture or distribution or utilization in the production of illumination, or of heat, or of power," was presented to Robert B. Harper, vice-president, The Peoples Gas Light and Coke Co., Chicago, May 20, at a colorful ceremony in Philadelphia.

The award was made to Mr. Harper "in consideration of his leading part in the development, supervision and direction of a research and testing laboratory of outstanding excellence in the gas industry, his co-operation personally and through members of his staff with the gas industry generally, and his own distinguished work in the chemistry and physics of the gas industry." The laboratory referred to in the citation is the American Gas Association Testing Laboratory in Cleveland, Ohio.

Presentation of the medal to Mr. Harper was made at the same time other awards of The Institute were presented for scientific and technical achievements during the ceremonies marking formal dedication of the Benjamin Franklin Memorial, May 19, 20, and 21.

This is not the first time Mr. Harper has been honored for notable achievement in the gas industry. He received the Beat Medal at the 1932 A. G. A. Convention for having presented the most outstanding technical paper at A. G. A. meetings during the year. His paper on "Gas Flames in Conversions to New Gases" won him this distinction.

Named Vice-President of Philadelphia Co.

PRESSLY H. McCANCE has been elected a vice-president of Philadelphia Company, according to an announcement by Frank R. Phillips, president of the company. Among the subsidiaries of the Philadelphia Company are the Duquesne Light Co., the Equitable Gas Co., and the Pittsburgh Railways Co.

Mr. McCance, who was formerly assistant to the president and director of per-

sonnel, has a record of many years service with the company. He entered the company's law department in December, 1923, where he served until 1929 when he was made director of personnel. In 1937 he was named assistant to the president.

Mr. McCance, a native of Pittsburgh, is a graduate of Princeton University and the Law School of the University of Pittsburgh.

Elected Directors of U. S. Chamber

TWO prominent public utility men were elected directors of the United States Chamber of Commerce at the recent annual meeting of the national chamber in Washington, D. C. This distinction was conferred upon Thomas J. Strickler, vice-president, Kansas City Gas Company, Kansas City, Mo., and James F. Owens, president, Oklahoma Gas and Electric Co., Oklahoma City, Okla.

Mr. Strickler is chairman of the A. G. A. Committee To Conduct National Advertising.

Engineers Name Quinn

JOSEPH F. QUINN, head of the commercial sales department of The Brooklyn Union Gas Company, was elected president of the Brooklyn Engineers Club by acclamation May 12. Mr. Quinn, who attended Massachusetts Institute of Technology and Columbia University, is an active member of the American Gas Association, and a past chairman of the Industrial Gas Section.

Six Salesmen Win Trip to New Orleans

SIX new business representatives of The Gas Service Company, Kansas City, Mo., won free trips to the Natural Gas Department Convention in New Orleans, May 9-12, as a result of their gas appliance sales in the Door Bell Pushers' Contest. The winners of the contest, which started Jan. 1 and closed April 23, were John Albus, Hutchinson; Ammon Jones, Wichita; Harold Legge, Wyandotte; H. A. Neudorff, St. Joseph; Paul Cruik, El Dorado; Joe Mitlawski, Topeka.

The New Orleans trip was offered to the six leading salesmen in the company's territory with only one salesman from any one city being eligible. The contest was judged on a point basis with the number of points for various types of appliances sold changing each month.

Laclede Gas Light Co. Elects President



L. W. Childress

L. WADE CHIL-
DRESS, chairman of the board of the Columbia Terminals Company and a prominent St. Louisan, was elected president of The Laclede Gas Light Company on May 10, succeeding Joseph B. Wilson, who resigned April 20.

B. F. Pickard was re-elected operating vice-president; E. L. White, secretary-treasurer; and Alfred Hirsh, assistant secretary-treasurer. William C. D'Arcy, president of the William C. D'Arcy Advertising Company of St. Louis and a member of the board, was elected a member of the executive committee which now includes Mr. Childress, M. E. Fiewell of Chicago, A. L. Jackson of New York, E. E. Pershall and A. L. Shapleigh of St. Louis.

Mr. Childress was chairman of the executive committee at the time of his election as president. No successor as chairman has been selected.

Olcott Joins Staff of Advertising Firm



H. W. Olcott

H. W. OLCOTT has joined the staff of Bozell and Jacobs, Inc., as assistant to E. Lundgren, vice-president in charge of the Indianapolis office.

Mr. Olcott was formerly advertising manager of The Philadelphia Gas Works Co., resigning his post there to become associated

with Daniel Starch and Staff, New York City, where he was account executive for the New England, New York and Pennsylvania gas and electric properties of the Associated System. While with the Philadelphia company, he was a member of the copy committee working on the A. G. A. national advertising campaign. Prior to moving east, Mr. Olcott was advertising manager of the southern Indiana properties of Midland United Co.

New Appointments in Coast Counties

R. L. NANCE has been appointed to fill the newly created position of service supervisor for the Coast Counties Gas and Electric Company, according to H. L. Farrar, president of that organization. Mr. Nance will make his headquarters in Santa Cruz, Calif., and his activities will include the entire service area of that company, extending from the Imperial Valley in the south to Dunsmuir, Yreka and Arcata in the north.

E. B. Mason, Jr., replaces Mr. Nance as district manager in the Imperial Valley division of the company, with headquarters at El Centro, where he will be in charge of all commercial and sales activities.

Curtis Young has been transferred from the Watsonville District to Imperial Valley as district gas foreman and will be in charge of gas operations there.

Receive McCarter Medals for Life Saving



Charles Roberts receiving a McCarter Medal from Herbert H. Ferris. In the picture, left to right, are: J. P. Leinroth, Mr. Ferris, Mr. Roberts, and Harry A. Sutton

C HARLES ROBERTS, a fitter in the gas distribution department, South Amboy district, Public Service Electric and Gas Company, was presented with a McCarter Medal, April 12, at the annual convention of the New Jersey Gas Association. The award was made in recognition of his outstanding achievement in resuscitating a person overcome by gas. The resuscitation took place last May in Jamesburg.

The medal was presented to Mr. Roberts by Herbert H. Ferris, general manager of the gas department. Officials of the New Jersey Gas Association took part in this ceremony.

This is the second award the South Amboy man has received for successful application of the Schafer prone pressure method of resuscitation. He was given the National

Safety Council President's Medal previously for reviving a person who had been rescued from drowning.

Four employees of the Consolidated Edison Company of New York were honored recently with McCarter Medal awards. This distinction was conferred upon Harry V. Bennett, Joseph B. Brady, Anthony DeCanio, and Charles D. Quinn, all of the customer service department. These men had performed heroic acts of life saving by resuscitation of persons overcome by gas.

A. E. Turner, general superintendent, made the presentations to Messrs. Bennett, Brady and DeCanio on April 28. Mr. Quinn received his award from W. H. Bogart, stores manager, on April 26.

McCarter Medals are awarded by the American Gas Association through the generosity of Thomas N. McCarter, president, Public Service Electric and Gas Company.

On the night of April 22, the employees of The Hartford Gas Company, Hartford, Conn., gave a minstrel show in a local auditorium at which some 500 people were in attendance. Just previous to the show, N. B. Bertolette, president of the company, presented a McCarter Medal and Certificate to William J. Wylie and a Certificate of Assistance to Thomas E. Riddell

for the saving of life by the Schafer prone pressure method.

Mr. Bertolette briefly explained the significance of the award. He congratulated the men on their achievement.

Elected Directors of Brooklyn Group

C LIFFORD E. PAIGE, president, The Brooklyn Union Gas Company, and past president, American Gas Association, has been elected a member of the board of directors of the Brooklyn Chamber of Commerce for the term June 1, 1938, to May 31, 1941.

Mary E. Dillon, president, Brooklyn Borough Gas Company, was re-elected a director for the same term.

Texas Graduating Class Attends Convention

TWELVE lanky Texans who comprise the graduating class of one of the least crowded professions in the United States were in New Orleans, May 9-12, to form a miniature gas association within the convention of the Natural Gas Department of the American Gas Association. They represented the first graduating class in natural gas engineering ever produced by the Texas College of Arts and Industries at Kingsville, Texas.

Convention Calendar

JUNE

- 7-9 Edison Electric Institute
Atlantic City, N. J.
- 7-10 Home Service Conference and Training Course
Hotel Muehlebach, Kansas City, Mo.
- 9-10 Canadian Gas Association
Royal York Hotel, Toronto, Ont.
- 13-14 Public Utilities Advertising Association
Detroit, Mich.
- 14-18 Syndicated Union of Gas Industry of France
Saint-Malo, France
- 15-17 Danish Gas Association
Allings-Sandvig
- 16-17 Pacific Coast Gas Association, Northwest Conference
Portland, Oregon
- 23-24 New England Gas Association, Sales Conference
Viking Hotel, Newport, R. I.
- June 27-July 1 American Society for Testing Materials
Chalfonte-Haddon Hall, Atlantic City, N. J.
- June 28-July 1 American Home Economics Association
William Penn Hotel, Pittsburgh, Pa.

JULY

- 1-2 Michigan Gas Association
Grand Hotel, Mackinac Is., Mich.
- 27-28 West Virginia Oil and Natural Gas Association
Charleston, W. Va.

SEPTEMBER

- 14-16 Pacific Coast Gas Association
Santa Barbara Biltmore Hotel,
Santa Barbara, Calif.

OCTOBER

- 3-6 American Transit Association
Toronto, Ont.
- Wk. 10 American Gas Association
Atlantic City, N. J.
- 10-14 National Safety Council
Stevens Hotel, Chicago, Ill.
- 24-28 National Hotel Exposition*
Grand Central Palace, New York, N. Y.
- National Metal Congress and Exposition*
Detroit, Mich.

DECEMBER

- 5-10 National Exposition of Power and Mechanical Engineering*
Grand Central Palace, New York, N. Y.

* Includes exhibit sponsored by A. G. A. Industrial Gas Section.

Affiliated Association Activities

Wisconsin Utilities Association



Bruno Rahn

ident, became chairman of the Advisory Committee. Mr. Rahn's term of office began May 1.

A. P. Gale, executive vice-president, Wisconsin Power & Light Co., Madison, was elected vice-president. John Dockendorf, assistant research engineer of The Milwaukee Electric Railway & Light Co., was elected treasurer.

Mr. Rahn has been continuously active in Association work. He was president of the old Wisconsin Gas Association in 1921.

BRUNO RAHN, vice-president and general manager of the Milwaukee Gas Light Co., was unanimously elected president of the Wisconsin Utilities Association in the annual mail ballot voted by the Association's membership. He succeeded C. E. Kohlhepp, who as retiring president,

Power Company; H. G. Armstrong, Terre Haute, of the Indiana Gas Utilities, and A. V. Grief, vice-president and general manager of the Gary Heat, Light & Water Company.

The utility men and their wives heard L. L. Bomberger, president of the Indiana State Bar Association, talk on "this meddling with private industry stirred by political motives" at the annual banquet. Other speakers on the well-rounded program discussed employee education, service and public relations, accounting problems, the certified performance range, and other industry problems.

Pennsylvania Gas Association



E. E. Mensch

Gas Works Co., president of the Pennsylvania Gas Association, at the thirtieth annual convention of the State association. The meeting took place May 3-5 at Skytop, Pa., and attracted a record attendance.

"It is evident from the support pledged for the third year's program of national advertising that the gas industry considers that activity a permanency," Major Forward said. He was backed up by President Christman who urged that the campaign be "extended further and reinforced locally with larger advertising appropriations."

E. E. Mensch, division manager, Williamsport, of the Pennsylvania Power & Light Co., was elected president for the ensuing year. Other officers elected were: L. B. Eichengreen, Philadelphia Electric Co., vice-president; M. A. Boylan, Scranton-Spring Brook Water Service Co., vice-president; P. T. Dashiell, The Philadelphia Gas Works Co., vice-president; F. W. Lesley, Pennsylvania Gas & Electric Corp., York, secretary; and W. G. Sterrett, Philadelphia Electric Co., treasurer.

The opening sessions were devoted to distribution, accounting, customers and employees relations problems of the industry. Sessions on production and new business were held during the final day of the convention.

Missouri Association of Public Utilities



Chester C. Smith

comprises virtually all of the privately owned electric, gas, and water companies in Missouri.

Other officers elected were: First vice-president, E. H. Lewis, St. Louis County Gas Company, Webster Groves; second vice-president, Ben C. Adams, Gas Service Company, Kansas City; third vice-president, O. F. Funk, Union Electric Company of Missouri, St. Louis; treasurer, Hermann Spoehrer, Union Electric Company of Missouri, St. Louis; secretary, N. R. Beagle, Missouri Power & Light Company, Jefferson City; assistant secretary, Jesse Blythe, Jefferson City; managing director, E. A. Beer, Jefferson City.

The following Executive Committee was elected: A. E. Bettis, Kansas City Power & Light Company, Kansas City; Fred Karr, Gas Service Company, St. Joseph; C. E. Michel, Union Electric Company of Missouri, St. Louis; H. B. Newman, Missouri Utilities Company, Cape Girardeau; L. W. Helmreich, Capital City Water Company, Jefferson City; B. F. Pickard, Laclede Gas Light Company, St. Louis; D. W. Snyder, Jr., Missouri Power & Light Company, Jefferson City; T. J. Strickler, Kansas City Gas Company, Kansas City.

Indiana Gas Association



Dean H. Mitchell

Hammond, vice-president and general manager of the Northern Indiana Public Service Company, was elected president of the association, succeeding H. Carl Wolf, Muncie, president of the Central Indiana Gas Company. Paul A. McLeod, New Castle, of the Public Service Company of Indiana, was named vice-president, succeeding Mr. Mitchell in that office. For many years, Mr. McLeod had been secretary-treasurer of the association. The new secretary-treasurer is H. Wayne Thornburg, Anderson, of the Central Indiana Gas Company.

Directors for 1938-39 are Louis B. Schiesz, Indianapolis, vice-president and general manager of the Northern Indiana

WITH 450 representatives of Hoosier gas companies in attendance at the twenty-eighth annual convention of the Indiana Gas Association at Gary, May 16 and 17, the association held its most successful assembly in its history.

Dean H. Mitchell,

Columbia Gas Course Enrolls No. 1901

WITH the enrollment of Willard Morrow of the Lake Shore Gas Company, Ashtabula, Ohio, in the Columbia University Extension Course in American Gas Practice for Home Study conducted by Professor J. J. Morgan, the total enrollment reached 1900. Student Number 1901, the last reported, was John Miller of the Public Service Electric and Gas Co., Newark, N. J., who enrolled on April 28. The continued popularity of the course is a tribute both to Professor Morgan and the students who thus place themselves with the most progressive element in the gas industry.

Accounting Section

D. H. Mitchell, Chairman

H. W. Hartman, Secretary

H. A. Ehrmann, Vice-Chairman

Auditing—What Is It?

WHAT are the responsibilities of an auditor? What tools does he need to discharge them? In attempting to give answers to these questions it is with due deference not only to the authorities whom I have not consulted but to many readers who may be more competent to answer them than I am. Therefore these answers should be considered merely as those found helpful in my own seeking of a response to the question "Auditing, what is it?"

Auditing requires a combination of painstaking application to routine with a lively imagination. Auditors are responsible not only for the accuracy in presentation of facts in a published balance sheet and income statement and for making certain that such published statements are true and complete, but also for insuring through verification and otherwise, that the history of the business is accurate, and completely recorded in its books of account from day to day throughout the year. They are responsible for the devising and the application of methods which will guard against loss either through carelessness or dishonesty.

Accounting and Auditing

While a good auditor must be a good accountant, there is a clear distinction between his responsibilities and those of the accountant. Both are concerned with systems, but the auditor is more concerned with verification of facts and the accountant with their recording, assembly and presentation. There is a difference in emphasis more than in procedure. Both would insist on a charge being made to the proper account, but the auditor would also want to know if the purchase resulting in the charge were properly authorized, if the material were actually received, if the price agreed with quotation.

The accountant assembles the facts verified by the auditor in reports, routine or special, prepared for the attention of the management and to aid the administrative authority of the company in formulating its policies, making plans and decisions. The statistician also has his function in collecting, tabulating and presenting numerical facts. His presentations generally cover longer ranges of time with emphasis on trend or comparisons with special significance, or unit rates or other arrangements of data than the accountant's balance sheet or income statement, but he must rely on

By H. C. MOORE, JR.

Treasurer, New England Gas and Electric Association

the accountant for many of the records from which he draws his material, just as the accountant must rely on the auditor to verify the facts he presents.

There are various kinds of auditors. There is the certified public accountant who is called in annually to make what is usually termed a balance sheet audit leading to a certificate that the balance sheet truly reflects the status of the business as of a given date, and that accompanying income statement, analyses of surplus, etc., are accurate statements of results for the particular year. The extent of the work of such auditors is dependent to a major degree on the system of audit control established and operated by the company for which the audit is being made.

Bookkeeping Accuracy

As is stated in a recent article in the *Journal of Accounting*, "the accounting profession by long established practice has recognized that the volume of business, even of medium-sized companies, precludes the detailed examination of every transaction and, therefore, restricts itself to reasonable tests as a means of passing upon the general accuracy of routine bookkeeping entries." It is the accepted practice of public accountants to consider the adequacy of the system of internal check in determining the extent of the examination required to satisfy themselves as to the accuracy of the records.

In these days of stress in the gas industry when managements are seeking every possible means of economy it has, no doubt, happened as in other businesses that the thought has been expressed in some way, "Well, we have an annual audit, why have this staff to carry on so-called auditing throughout the year?" How many errors do they actually find? If the management of a company has a responsibility to security holders and regulatory authorities to make correct annual statements reflecting the state of its affairs, such a so-called economy would be most disappointing, because not only would the safeguards of daily attention to the transaction of the business be sacrificed, but in addition the outside auditor when called in would find it necessary to do a much more comprehensive and expensive job than if he were

satisfied with the system of internal check found in use.

I have already referred to two of the most effective devices of auditing, the control account and the internal check. In the days of proprietorship and of small business, internal check had not become a term of general use because the proprietor generally managed to know the details of his business himself, but with the growth of business, delegation of authority became necessary and the necessity for this form of safeguard arose. In the utility business, the size of operations has for so long been great enough to require the delegation of authority that we hardly think of it except in terms of its existence.

Internal Auditing

Verification by outside auditors in most cases must be post mortems and, therefore, we come to another kind of auditors, the internal auditors. These are the men regularly employed by the companies to carry out the regular day to day verification of the transactions of the business and who depend in the discharge of their responsibilities to a major degree on the care with which they have installed systems of internal check. When the post mortem of an annual audit discloses any irregularity, the loss may have occurred so long ago that it is impossible to make recovery. By their very nature, such audits do not usually take place until after the close of a fiscal period. The internal auditor, however, is on the job every day, trying to make sure that all the receipts of the business actually reach the company's bank accounts and that all its disbursements are made for goods or services received and received under proper authorization.

We are all, to some degree, familiar with the fundamentals of internal check. It is generally understood that they consist of so arranging the work of those engaged in the operation of the business as to coordinate the work of one person or group of persons with that of another, so that it checks the work of the other.

Accounts receivable credits should never be posted by an employee responsible for their collection. The combination of the same employee as a foreman who reports time and as a paymaster who passes out pay checks is as dangerous as leaving a bundle of currency unguarded on the door-sill. Employees authorized to draw petty cash checks should not also reconcile the bank accounts. Checks on general accounts should be sup-

ported by vouchers bearing evidence of authority for incurring the liability to be discharged and the verification of the completeness of the papers, the signature and the countersignature should be by different individuals.

Meters should not be installed except on pre-numbered meter orders of which a control copy must be furnished to the Customers Accounting Department and that department should make sure that every number is accounted for.

Bills for service should be prepared and mailed by a group entirely independent of those responsible for their collection. The total of the bills prepared should be reported as revenue and a charge made to the control account, Accounts Receivable, Customers. The total of collections should be reported by the cashiers and credited to the same control account. Unpaid balances and their total should be reported by ledger clerks to be carried forward on the next month's bills, so that they may be checked with the control account and that the bills showing such balances may be mailed direct to customers without passing through the hands of ledger clerks or cashiers. This internal check insures that an unreported collection will come to the attention of the customer and he may be depended upon to call attention to it.

Delegated Authority

Another significant term is "authorization." It is not enough to know that something has actually happened. Was it properly authorized? The Board of Directors has placed the responsibility for proper operation of the utility in its Manager. Were he a superman, he could exercise control by signing every piece of paper authorizing or making an expenditure, whether it be purchase requisition, payroll authorization or check.

The answer is, of course, delegated authority and with its existence it becomes the responsibility of the internal auditors to see that the authority for transactions of the business is sufficient. To quote, "It is essential that subordinates be deterred from following a course not provided for in the plans of the executive; it is equally essential that they be compelled to do what they are expected to do in carrying out the plans if operating results are not to fall short of expectations."

Of course, there are other ways of insuring the effectiveness of administrative control, but none has more detailed an application or more necessity for alert intelligence than internal audit. Confidence in the observance of authority and the adequacy of the check to insure it is a tremendous aid to the outside auditor.

Then, there is the local office auditor. It depends on the size of the particular operating unit whether his functions are carried out by a special group of full-time auditors or by individuals designated by the chief accounting officer, but if the outside auditor is not to have far more checking to do than is usually expected in his

(Continued on page 240)

LUNCHEONS!!!

224
Men
Attended



224
Talks
Given
At Least

WHAT LUNCHEONS ???

The Four Luncheon Conferences of the American Gas Association Accounting Section at the Convention.

Last year 224 attended and if any of those did not speak, others spoke several times. Subjects are developed and presented and frank opinions are expressed. No minutes or other records are kept, consequently real facts are told and actual experiences are described. Members present their problems and learn what to do,—and what not to do.

The Accounting Section Luncheon Conferences are outstanding features of the Convention. And again this year, four luncheon conferences, with discussion leaders who thoroughly understand their subjects, will be held. Promise yourself to come this year to tell what you are doing and to hear how others are coping with the same problem. If you have a subject you wish discussed, write to the Chairman; he'll put it on the agenda. He is T. S. Lever of The Philadelphia Gas Works Company and his address is 1800 North 9th Street, Philadelphia, Pa.

The Convention will be held

THE WEEK OF OCTOBER 10, IN ATLANTIC CITY, N. J.

Commercial Section

Hugh Cuthrell, Chairman

J. W. West, Jr., Secretary

F. X. Mettenet, Vice-Chairman

How the Washington Office Helps Promote the Sale of Gas

THE decision of the American Gas Association to open a Washington office in 1932, was primarily to sell more gas to the United States Government. In 1932, the gas industry was selling to the federal government approximately three billion cubic feet of gas annually. In 1937, we had more than 700 gas contracts in operation and the annual consumption was in excess of twenty billion cubic feet.

The cost of operating the Washington office in relation to the contract price of the gas was four-tenths of one per cent. This is only one way in which the Washington office helps to promote the sale of gas. My services are available to both utility executives and Government officials in ironing out a great many of their fuel problems.

Housing Activities

First let me explain the set-up of both the United States Housing Authority and the Federal Housing Administration. While I only mention these two, there are several other housing activities in the Government; so when you write asking me about a Government building plan at some point and you do not hear from me for a few days, you will understand that I am contacting all the housing activities of Government to ascertain which one is interested in that particular project. If you will identify the project in your letter as being a United States Housing Authority, Federal Housing, or Resettlement project I can give you more prompt service.

One manufacturer of appliances wrote in recently that the Government was advertising for bids on some gas ranges and requested more details. There are seventeen different purchasing agencies of Government in Washington, anyone of which could be buying gas ranges; plus the fact that many government activities advertise separately for and purchase supplies and equipment in the field.

The U. S. Housing Authority was created in the Wagner-Steagall Housing Act of 1937 and came into being last November 1. Nathan Straus is Administrator of the Housing Authority, which has for its program the lending of funds for slum-clearance and low-rent housing projects for slum dwellers in the lowest income brackets. In brief, the Housing Authority functions as follows:

1. Deals with public housing agencies only.
2. Makes loans for capital cost of slum-clearance projects and grants annual sub-

The accompanying paper by Mr. Bean was presented May 9 during the first meeting devoted to domestic gas sales at the Natural Gas Department Convention in New Orleans. H. E. Meade, New Orleans Public Service Inc., chairman of the Domestic Sales and Utilization Committee, presided at the meeting. W. C. Wiegel, Lone Star Gas Company, Dallas, is vice-chairman of the committee which prepared the program.

A feature of the first sales meeting was an inspiring talk by Streuby L. Drumm, New Orleans, urging natural gas companies to get behind the promotion of the Certified Performance Range. This range, which will embody many superior qualities, will be ready for distribution August 1.

A domestic sales round table luncheon conference was held Wednesday, May 11, during the convention. The principal speaker was Henry O. Loebell, Natural Gas Pipe Line Co. of America, Chicago, whose subject was "Analyzing the Mass Market When Organizing a Sales Program."

The second domestic sales meeting took place Wednesday afternoon. It included the following important papers: "Commercial Refrigeration," Carl Conkey, Servel, Inc., New York; "Selling Gas Heat to New Homes," H. M. Crawford, Pacific Gas & Electric Co., San Francisco; "Dressing up the Kitchen," F. A. Sansom, International Nickel Co., New York; "Home Service as an Aid to Sales."

Herman Russell, president, Rochester Gas & Electric Corp., Rochester, presided at a home planning luncheon symposium, Thursday, May 12. Bruce Wilson, of the Federal Housing Administration, Washington, D. C., gave an informative address on the Federal Housing Administration's Small House Program.

Other papers on vital sales topics, presented at the General Sessions and the Industrial Gas Sales Conferences, are reported elsewhere in this issue of the "Monthly."

By GEORGE BEAN

A. G. A. Fuel Representative,
Washington, D. C.

sides to assure their low-rent character.

3. Promotes building by cities (local housing authorities) at rentals that slum dwellers can pay.

4. Addresses itself solely to housing for the underprivileged one-third of the population.

5. Title to property and projects remains with cities. (Local housing authorities.)

This program supersedes the Public Works Administration's slum clearance program. Almost every city in the United States with a population of 25,000 or over will create a local housing authority, and request that funds be allocated to them by the Government. The U. S. Housing Authority proposes only to exercise supervision of construction and rents to be charged. They will not concern themselves with the selection of architects, sites, building material, equipment, or fuels to be used; yet I am convinced after several conferences with officials and with my knowledge of what happened under the PWA housing program that the new Housing Authority will be compelled to exercise more jurisdiction than was first contemplated.

With respect to the fuel for cooking, water heating and space heating, I am con-

fident the Washington office of the Housing Authority will make thorough investigations of fuel costs, and will make the final decision on what fuel is used. This being true it is important that gas company officials keep in the closest possible contact with local housing authority officials in an effort to have gas approved by local authorities and architects. However, such approval does not necessarily mean that you will obtain the contract, for when the recommendations of the local housing authorities reach Washington they will probably be studied by the Washington engineers to determine whether or not by using combined or wholesale rates another fuel other than that recommended by the local housing authorities would be cheaper. I would add that the policy now is to purchase gas at the wholesale rate through a master meter and the rent charged for the apartment or house includes the gas service. In order that the industry may profit by getting the largest possible part of this business, I would suggest that you keep me fully advised of your contacts with local housing authorities, and of the rates quoted them.

The Federal Housing Administration under Stewart McDonald, Administrator, is concerned with both the modernization of old homes and the construction of new homes which are financed entirely by private capital through governmental mortgage insurance. You are all, no doubt, fa-

miliar with this program and with the program of the American Gas Association which is in cooperation with same.

I have served as one of the Industrial Advisors to the Federal Housing Administration and recently attended a meeting when the new program was explained. Under this program all gas equipment or appliances to be used must bear the stamp of approval of the American Gas Association Laboratories. So far the only gas equipment that is on their approved list is house heating equipment and gas water heaters. No stoves or ranges of any kind are on the approved list. In my opinion the approval of these and other appliances are subject to further negotiations.

Before leaving Washington I had another conference with Federal Housing Administration officials and was advised that under Title I of the Act, which deals with modernization of homes, gas ranges might be approved, but it would be necessary for the home owner or contractor to make a special request to the Federal Housing Administration, explaining the type of range to be used and stating whether or not it would be built in and become an integral part of the kitchen equipment. This would also apply under Title II of the Act which deals with the building of new homes. The entire program makes it necessary for gas company officials to keep in the closest possible contact with local architects and builders. Copies of all correspondence with the Federal Housing Administration should be sent to me.

Post Office Set-Up

The Treasury Department set-up is rather complicated, particularly with respect to post office buildings. For instance, in building of a post office, Federal Court House, Custom House, Department of Justice Building, or a Public Health Building (which includes Marine Hospitals), the Treasury Department prepares the plans and specifications. These plans are prepared under the direction of the Supervising Architect of the Procurement Division, who specifies that the boilers be equipped to burn two fuels where it is possible to obtain competition. In one instance a job will be equipped to burn either oil or gas; another job, coal or oil; and another, coal or gas; but gas equipment is only specified where natural gas is available.

When a post office building is nearing completion, bids will be invited by the Post Office Department for the two fuels mentioned in the specifications, and the contract will be let to the lowest bidder, B.t.u. against B.t.u.; no intangible savings being considered. As yet we have been unable to have the Treasury Department specify a straight gas boiler installation. They insist on specifying combination burners, stating that it is against the policy of the Treasury Department to make boiler installations for one fuel alone where two are available.

The Bureau of Indian Affairs operating under the Secretary of the Interior is another extreme. A separate appropriation

by Congress is provided for each branch of this service. As an illustration, Congress passes a bill for the purchase of fuel at the mine for the reservation, and this is done for each Indian Reservation in the country. Another appropriation is made for the transportation of fuel.

We had a case a few years ago where gas was in competition with coal. The Bureau of Indian Affairs called for bids and the coal people submitted a bid of about fifty cents a ton at the mine. The gas bid was seventeen cents per M cu.ft. delivered at the Reservation line. The Bureau of Indian Affairs wanted to use gas, but under congressional set-up with the purchase of coal and transportation of same under two separate appropriations by Congress, they felt compelled to give the contract to the coal people.

The American Gas Association protested the award and we had a four months' battle with the Director of the Budget and the Comptroller General of the United States, the result being that a decision was reached that the gas people would have the right to make a double proposal, one for the purchase of gas at the well and one for the transportation of same through the pipeline. The contract was obtained for gas, and this decision is still in force.

The Veterans Administration is an independent organization where all engineering data including labor saving and the life of equipment are taken into full consideration the same as with any commercial enterprise.

The War and Navy Departments will also give consideration to our engineering data in reaching a determination as to what fuel they will use, and many of our largest fuel contracts have been made with the Quartermaster General's Office.

Over 600 Cases Handled

For the reason that there is no unified government program for fuel contracts or the purchase of materials, it requires years of experience on the part of anyone to give the best representation. We have handled more than six hundred individual cases with government departments and these include matters of every nature, for both utility and manufacturer members.

The personnel of the numerous government bureaus in Washington is composed of men of varied types and viewpoints. Again, when one has come to know the officers in charge and learned their respective systems, then the Administration changes; our Army and Navy officials are sent away and others replace them, causing many policies to be changed, bureaus abolished, or consolidated, and one's work must all be done over again.

I would like to pay tribute to the high type of men in charge of government purchasing bureaus. I have met and known hundreds of them during my many years in Washington and I have always found them anxious to get the best at the least possible expense to the Government, and I have never had one government official

ask for, or even intimate that he expected anything personally for having made a favorable decision to one of my clients.

One important matter that I want to bring to the attention of sales executives is that whenever a government project of any kind is proposed in your territory you first take the matter up with my office and let me get all the facts concerning the project for you before you submit any proposal to either the local Government authorities or to Washington. I make this suggestion by reason of the fact that it has frequently happened in the past that engineering or sales departments have prepared very elaborate data and submitted it to government officials before they knew all the facts in the case. Therefore the data submitted were practically of no value and had to be completely revised. I can save you all this time if you will first submit the matter to me. May I ask that you send me copies of all the correspondence and engineering data you submit to the Government in order that I may be fully advised and thereby best able to serve your interests.

Assistance to Federal Officials

We are also called upon to assist government officials in their fuel and other problems as they relate to the gas industry. Recently we worked with War Department officials for more than a year in developing a standard set of specifications for ranges and water heaters. We have also worked out an approved standard specification for both domestic and heavy duty ranges with the Veterans Administration. I have been called into conference with Veterans Administration Officials in the preparation of standard requirements for the installation and care of all gas burning equipment. In this particular matter, before submitting my recommendations for the standard manual, I had the advice and counsel of many utility executives, the engineering staff of the American Gas Association, and Mr. Conner, director of the Laboratories. With the Veterans Administration we are always consulted for gas rates at any of their facilities, and make every effort to obtain gas rates that will meet the competition of other fuels.

With the Procurement Division of the Treasury Department we work with the utility and the Government in obtaining gas rates, advising where gas is available, and furnishing data on pipe sizes, location of meters and their size. Before coming here, this department requested that I obtain for them the dimensions of meters for a heating load in the natural gas territory where the consumption of gas would be approximately 25,000 cubic feet per hour.

We have assisted in making up specifications for Civilian Conservation Corps, arranged broadcasting time through the Commerce Department, assisted Labor Department and Commerce Department in preparation of their annual reports on vital statistics and sale of gas in cubic feet,

(Continued on page 239)

No Limits for Gas Is Verdict of New York Sales Meeting

WITH approximately 400 in attendance, the annual New York-New Jersey Gas Sales Conference, held May 18 and 19 at the Hotel New Yorker, New York City, was an outstanding success. A well coordinated program of live sales topics was presented under the direction of William J. Schmidt, of the Long Island Lighting Co., chairman of the Sales Council.

In the keynote address, E. E. Jeffe, vice-president, Consolidated Edison Company of New York, challenged the economics of the many highly promotional activities now in motion for electric cooking. "We are firmly convinced," he said, "that the field of domestic cooking rests safely and securely in the lap of the gas industry except under extraordinary conditions."

Electric Cooking Subsidized

Speaking from the experience of the largest combination company in this country, he asserted that there would be a demand, if there were a requirement, for the replacement of gas as a fuel for cooking purposes with electricity. "Why then," he asked, "is it necessary, in those communities where progress has been made in the installation of electric ranges, that such progress has been made at the expense of the utility through subsidy of such installation?"

"We as a company," Mr. Jeffe continued, "have had our experience and it is because of this experience and because our sales promotion efforts are coordinated with the operating branches of our company, that we have determined that presently there is no benefit in the aggressive promotion of electric cooking. The fact is that there may be lack of benefit to the company, and to the consumer in promoting any other medium than gas for cooking purposes."

"I am certain," he said, "with the early advent of the Certified Performance Gas Range, that the position of gas as a cooking fuel will be assured and will not be severely challenged on a sound basis until other means of distribution of electric energy are devised."

Mr. Jeffe also found no limitation for gas in the fields of refrigeration and house heating.

Liberty Home Program

The A. G. A. Liberty Home Program was described by F. W. Williams, of the Home Appliance Planning Bureau. Results in the architects' contest to date have been highly satisfactory and great interest is being shown in the builders' contest.

An inspirational address, "Promotion as Keynote to Successful Sales," by B. Andrews, Street Railways Advertising Co., New York, closed the first morning session.

The afternoon session, with J. P. Hanlan, Public Service Electric & Gas Co., Newark, presiding, included the following addresses: "Customer Relations," Dr. H. W. Hepner, Syracuse University; "Home Service Aids to Water Heater Sales," Flora G. Dowler, Binghamton Gas Works; and "Selling Gas Heat to New Homes," J. P. Leinroth, Public Service Electric & Gas Company. Mr. Leinroth called attention to the encouraging trend toward the more

general adoption of gas heating by the speculative builder.

A feature of this session was showing a film, "The Story of a House," sponsored by the Public Service Electric & Gas Company.

C. A. Kennedy, vice-chairman of the Sales Council, presided at the final morning session. The first speaker, Merrill N. Davis, president, A.G.A.E.M., urged the gas industry to cooperate in promoting the New York World's Fair by tying-in their local and national advertising with next year's exposition. He emphasized the great opportunity to promote gas service during the Fair.

"Selling Automatic Heating to the Low



Nils T. Sellman and E. F. Jeffe of the Consolidated Edison Co. of New York



King Photos

Above, left to right: R. A. Koebler, John A. Baumgarten, J. W. West, Jr., Chairman William J. Schmidt, Barrett Andrews, C. A. Kennedy, J. P. Hanlan

At left: Hugh Cuthrell, C. W. Berghorn, Merrill N. Davis, F. E. Sellman



Income Market," was the subject of an excellent paper by T. W. Halloran, New York Power & Light Corp., Albany. He described a rental sales campaign with slow

recovery conversion heaters which brought excellent results to his company.

The session concluded with a well-played skit, "Making a Water Heater Sale," presented under the direction of G. F. B. Owens, The Brooklyn Union Gas Company.

Lyda Flanders, Worcester Gas Light Company, presented the popular puppet show, "Handy McSaver," during luncheon.

Chairman Schmidt conducted the final session which opened with a General Electric film, "The Right and Wrong Way To Sell," featuring Professors Borden and Busse, sales training experts.

An outstanding presentation on the Certified Performance Range was made by R. S. Agee, sales promotion manager, A.G.A.E.M. With the aid of charts Mr. Agee explained the necessity for the C-P range program and urged the wholehearted support of the local gas companies for this vital phase of the industry's promotional activities. He was roundly applauded for his forthright remarks.

Lyle C. Harvey, president, The Bryant Heater Co., Cleveland, closed the meeting with a stimulating discussion of gas heating. "Join the Swing to Gas," was his advice.

Committee Reviews C-P Range Promotional Campaign



Members of the Domestic Range Committee at the New York meeting. Seated, left to right: C. C. Young, Gas Service Co., Kansas City, Mo.; George E. Frazer, Chicago, counsel; W. E. Derwent, George D. Roper Corp., Rockford, Ill.; J. W. West, Jr., New York, secretary, A.G.A. Commercial Section; F. M. Houston, Rochester Gas & Electric Corp., Rochester, N. Y.; R. A. Malony, Bridgeport Gas Light Co., Bridgeport, Conn.; C. W. Berghorn, New York (nearest camera), managing director, A.G.A.E.M. Standing, left to right: Allan Tappan, Tappan Stove Co., Mansfield, Ohio, vice-chairman of the committee; A. F. Rice, Southern California Gas Co., Los Angeles, Cal.; J. R. Booth, Roberts & Mander Stove Co., Philadelphia, Pa.; Lloyd C. Ginn, American Stove Co., Cleveland; E. R. Guyer, Cribben & Sexton Co., Chicago; R. S. Agee, sales promotion manager, A.G.A.E.M., and B. T. Franck, Grand Rapids Gas Light Co., Grand Rapids, Mich.

PLANs soon to be made public for the forthcoming promotional campaign on the Certified Performance Gas Range Program to be launched on August 1 were reviewed at a meeting of the A. G. A. Domestic Range Committee in New York City, April 25.

It was disclosed at the meeting that at that time twelve leading manufacturers had signified their intentions to produce these Certified Performance Gas Ranges. These appliances will be designed to conform to twenty-two specifications which will make for improved convenience, perfect performance, and maximum efficiency.

In order to insure complete coverage, the entire United States was divided into sixteen regions with a "regional manager" in charge of each. These regional heads assisted by state and district managers will conduct a series of demonstrations and lectures on the Certified Performance Gas Range Program for utility representatives and retail dealer outlets. During these

demonstrations colorful charts will be used to describe the features of the new range. Promotional plans for the product will also be discussed.

The progress made so far in preparing for the opening of the nation-wide drive was approved by the joint committee of manufacturer members of the Association of Gas Appliance and Equipment Manufacturers and gas company executives representing the American Gas Association. F. M. Houston, Rochester Gas & Electric Corporation, Rochester, N. Y., chairman of the committee, presided.

A Way Out!

It is an hour of trial for our sore beset utilities, though if worst comes to worst they may bend their gas pipe up into furniture and open a bar moderne.

—Judge.

Refrigerator Sales Increase During A. G. A. Campaign

SALES made during March in a nationwide gas refrigeration selling campaign conducted by the American Gas Association Refrigeration Committee were greater in number than those of a similar campaign in March a year ago, according to an announcement made by H. R. Sterrett, president of the New Haven (Conn.) Gas Light Company, chairman of the committee. Mr. Sterrett also reported that the number of salesmen throughout the nation who won awards in the contest was considerably greater in March, 1938, than in March, 1937.

"The March results are significant in view of the fact that it has been said that sales are harder to make this year," Mr. Sterrett stated. "Furthermore, March is not usually considered a favorable month for making big refrigerator sales, as that month precedes the regular summer selling season."

"The success of the March campaign is still more notable in that automatic refrigeration selling generally during March was lower this year than last. Consequently, the accomplishment of the contestants in the American Gas Association Refrigeration Committee's campaign confirms the increased acceptance of gas refrigeration by the buying public."

Salesmen who won awards in March, 1938, numbered 323 as against 262 winners in the same month in 1937.

The March campaign was preliminary to a major refrigeration selling drive now under way which began April 1 to last throughout June. The April-May-June contest is known as the "Make-Every-Minute-Count" or "Grandfather Clock" campaign, named after 17 grandfather clocks which are offered as trophies to winning companies. Large cash awards are also offered to gas utilities and their salesmen who make the highest selling records during the competition. A final "clean-up" drive will take place in July.

300 Gas Refrigerators To Be Radio Prizes

THREE hundred Servel Electrolux refrigerators will have been awarded to the same number of winners in a nationwide competition now being conducted over the radio which began May 20 to last for six weeks, it was announced by George S. Jones, Jr., vice-president and general sales manager of Servel, Inc., which is collaborating with the sponsors of the contest. The contest will last throughout June, ending July 1.

The contest is sponsored by Procter & Gamble, well-known soap manufacturing concern, in connection with its "Guiding Light" program which is broadcast every afternoon five days a week over the NBC coast-to-coast red network.

Industrial Gas Section

Hale A. Clark, Chairman

Eugene D. Milener, Secretary

Frank H. Trembly, Jr., Vice-Chairman

Industrial Gas Men Analyze Sales and Equipment Subjects at Natural Gas Convention

By EUGENE D. MILENER

American Gas Association

THE many types of modern industrial gas equipment and the different methods that are necessary in promoting their sale and in building up resulting gas loads were among the interesting features of the two industrial gas sessions Monday, May 9, and the industrial gas sales round table luncheon on Wednesday, May 11, held during the Natural Gas Department convention in New Orleans.

Experts on aggressive sales methods as well as experts on the engineering phases of equipment, its installation and operation, gave a running picture of industrial heating conditions in different industries and made many valuable recommendations for meeting these conditions to the better satisfaction of factory owners by the sale of more gas and more modern gas equipment.

Discussion following most of the presentations not only elaborated on some of the points brought out by the speakers but involved a barrage of questions and answers that kept interest in the proceedings at a high pitch. Hale A. Clark, chairman of the Industrial Gas Section, opened the morning session.

Servicing Industrial Equipment

Louis H. Hungate, Memphis Power & Light Co., in his paper "The Gas Company's Place in Servicing Industrial and Commercial Equipment" particularly emphasized the importance of making certain that customers know when they are getting service from the company, so that it will never be simply taken for granted. He urged that service "desk" men have previous field experience.

W. M. Gaylord, Springfield Gas & Electric Co., Springfield, Mo., discussed this paper from the operating men's point of view and gave some good pointers on tying the sales and service departments' efforts together.

George M. Parker, Mississippi River Fuel Corp., next spoke on "Developing Aggressiveness in Industrial and Commercial Gas Sales." Mr. Parker held that, particularly for large customers, nothing can take the place of personal contacts and that these contacts should extend from executives of plants down to the men who operate the furnaces. His paper brought forth a lively discussion which was participated in, among others, by N. C. McGowen, president, American Gas Association.

The final paper of the morning session was on "Analyzing Markets for Greater Industrial and Commercial Gas Sales" by

W. J. Amoss, New Orleans Public Service Inc. He was assisted by some original charts that compared percentages of industrial and commercial gas sales with total gas sales and growth in number of meters. Other charts showed market analyses of existing rates for specific customer groups, while still other charts showed dollar revenues for certain industrial and commercial

of absorption refrigeration, starting with an analysis of the large ammonia machines that were so popular years ago, but which were displaced by compression machines as the latter became perfected.

He gave reasons to show that the cycle is sound and that its interpretation along lines now being intensively developed will place it in a strong competitive position with compression refrigeration for air conditioning purposes in the popular sizes from five to 10 tons. Illustrating his paper with drawings and tables, he showed not



On the job in New Orleans—Left to right: Chairman Hale A. Clark, E. J. Hatzenbuehler, Franklin T. Rainey, and Eugene D. Milener

market groups. Mr. Amoss pointed out how market surveys can be extremely valuable in getting business. He cautioned, however, against too elaborate systems, holding that they can become so expensive as to eat up much of the profit they help to produce.

The second industrial gas session, like the first, had an attendance larger than that of any industrial meeting at previous natural gas conventions. Presided over by Franklin T. Rainey, The Ohio Fuel Gas Co., Columbus, the session covered three widely diversified industrial and commercial gas subjects, namely, absorption refrigeration, industrial furnaces and commercial cooking.

The paper entitled "Absorption Refrigeration for Summer Air Conditioning with Gas" by W. F. Friend, Ebasco Services, Inc., N. Y., and splendidly read by W. F. McKinney, United Gas Corp., Houston, Texas, bids fair to become a classic in the rapidly expanding literature on gas air conditioning. Mr. Friend, who is a member of the Industrial and Commercial Air Conditioning Committee of the Industrial Gas Section, gave a complete background

only the mechanics of air conditioning by this method, but also detailed breakdowns of operating costs and made comparisons with the cost of operating power driven machines. With 50¢ natural gas, 2¢ electricity and \$1.50 water, Mr. Friend concluded that the Air-O-Matic machine, which he had described in detail, will cost 1.91 cents per ton-hour against 2.45 cents for a similar electric driven compression machine.

Mr. Friend further concluded that "the prospect for summer air conditioning with natural gas fuel by means of absorption refrigeration is encouraging. This kind of apparatus is the direct equivalent of conventional motor-driven compressor units, and is likewise adapted to standardization and quantity production, when the development stage has been passed. It has definite advantages for residential requirements. Although not available for general sale and installation during 1938, some additional absorption installations will be made by gas utilities and other concerns this year. The gas industry as a whole should cooperate with equipment manufacturers to

the fullest extent, in bringing absorption refrigeration to the fore."

In a discussion of Mr. Friend's paper, L. O. Vogelsang, San Antonio Public Service Co., San Antonio, Texas, pointed out how absorption refrigeration meets many conditions in the Southwest and predicted that this method of summer air conditioning would fast become an important gas load builder.

Making no apologies whatever for modern industrial gas furnaces when compared with furnaces using other fuels, Henry M. Heyn, Surface Combustion Corporation, Toledo, produced on the screen a cavalcade of new, big, automatic gas furnaces and carried on a running description of their more important design features. He concluded that *knowing* new features is not enough but that the *application* of these features is of the first magnitude, and must be put across to bring in the money in the form of a steady gas load.

Commercial Cooking Discussed

The important commercial cooking field received attention from several angles. Clarence H. French, Standard Gas Equipment Corporation, discussed "Keeping Commercial Kitchens Up-To-Date" and W. M. Jacobs, Southern California Gas Co., Los Angeles, presented a paper on the same subject, but from the utility point of view. A detailed description of how he had modernized kitchens with new gas equipment in Chattanooga in the face of T.V.A. electric rates and promotional methods was contained in a pamphlet prepared by W. F. Reynolds, Chattanooga Gas Co., Chattanooga, Tenn.

Mr. French urged gas companies in self-defense never to let up on promoting new, up-to-date gas equipment as the only guarantee of keeping this high rate business intact. He advocated continuous sales surveys of kitchens, properly trained sales specialists, efficient service departments and, something which he said is often overlooked, complete, well-prepared, well-presented proposals. He warned gas men that they are in direct competition with the men who sell new dishes, floor coverings, display signs, bars, etc., when modernization is undertaken and that vigorous salesmanship is always necessary.

Mr. French showed pictures of many outstanding modernization jobs and new gas kitchens, including the large one in the Rainbow Room, Radio City, New York, pointing out that the fact that it is on the 64th floor did not prevent its being an all-gas kitchen. He also showed samples of full-page gas advertisements that are currently being run in hotel and restaurant magazines by the leading manufacturers of commercial gas cooking equipment. Reference was also made to the successful dealer-cooperation campaign just closing in Chicago.

Mr. Jacobs asked four pertinent questions:

- (1) Can a particular piece of cooking equipment be materially improved?

HOTEL, RESTAURANT AND COMMERCIAL SALES CONFERENCE

The important Hotel, Restaurant and Commercial Sales Conference sponsored by the Industrial Gas Section was held in New York City, at the Commodore Hotel, May 23-24, as this issue of the A. G. A. MONTHLY went to press. It will be reported in detail in the next issue of the MONTHLY.

- (2) Is there a more efficient way of accomplishing a certain operation?
- (3) Does physical and chemical science indicate that a certain cooking process is clumsy and inefficient?
- (4) Would a change in the arrangement of appliances within the kitchen increase its efficiency?

His paper was devoted largely to straight-from-the-shoulder answers to these questions and ended by warning all gas utilities to be on their toes against the "creep-

ing" approach strategy now popular with competitors in this field.

The industrial gas luncheon on Wednesday proved to be a very popular gathering. In a straight forward talk following this luncheon, H. Carl Wolf, president, Central Indiana Gas Co., Muncie, Ind., gave an unusually clear executive appraisal of how a natural gas company can make the most of its present industrial gas load and of the potentialities for greater load which its territory offers. Mr. Wolf expressed the opinion that the industry's views of the relative position of industrial and domestic gas are undergoing some rather radical adjustments.

George H. Bean, A. G. A. Washington representative, described the services his office is prepared to render all gas companies in non-residential government jobs and urged a wider use of these time saving services.

On the General Sessions industrial gas was ably represented by two addresses, by L. R. Boulware, vice-president and general manager, Carrier Corporation, Syracuse, N. Y., and Franklin T. Rainey, The Ohio Fuel Gas Co., Columbus, Ohio.

New England Hotel Men See Gas in Action



Partial view of gas exhibit at the Hotel Exposition

THE three little letters that make the big word GAS formed the heads of 6 streaming red comets that streaked across the beautiful black and cream background of the gas section of the 1938 New England Hotel Exposition held in Boston, Mass., April 20-22.

Sponsored by the New England Gas Association and participated in by the A. G. A. Industrial Gas Section, a group of prominent gas appliance manufacturers, and leading New England gas companies, the gas exhibit was a prominent feature of this year's gathering. The gas exhibit stretched

nearly from one end of the immense main ballroom of the Hotel Statler to the other, was brilliantly lighted and was comfortably arranged with settees and rugs so that sixty or seventy visitors could be received at one time.

Cooking equipment was featured at the gas section. Three batteries of heavy duty equipment, flanked with heavy duty deep fat fryers, big deck bake ovens and gas broilers attracted the attention of the thousands who walked past the display, many hundreds of whom stopped to examine the equipment in detail, keeping between 20

and 30 attendants busy from 10:00 A.M. until 10:00 P.M.

But heavy duty equipment was not all that the gas display had to interest the visiting hotel men and women. Smaller appliances, chiefly of stainless steel, were in operation. Two of the famous automatic revolving gas toasters were busy turning out samples of the finest toast. These interesting demonstrations fully upheld the contention of famous hotel men, such as Durries Crane, that nothing produces as fine a piece of toast as gas.

Bananas are rapidly gaining in popular favor as a cooked food and banana scallops were fat fried before the eyes of visitors to the gas display and were served to all, with a tasty sauce. This gas demonstration scooped the cooking part of the exposition with the first basic innovation in fat frying in years. Deep fat frying has been the technique on which fat frying has grown to success. The new gas fryers used for demonstrating fat frying of bananas are shallow fryers and are exclusive with gas. Among the technically inclined this innovation and its possibilities was an endless subject of discussion.

Featured in connection with modern individual shelf-deck bake ovens, was a display of tempting New England pies, cup cakes and pastries, baked in the all-gas kitchens of The Little Red Hen at Pawtucket, R. I. These were presented to the gas section by the proprietors in appreciation of the excellent service gas is rendering to this well-known rendezvous.

Cooking Tops Diversified

A glance at the heavy duty gas equipment impressed one with the diversity of cooking tops. Visiting chefs were quick to see that any combination of fry top, open top, solid top with centre heat or front heat, could be selected to meet both the requirements and whims of a kitchen staff whether the kitchen is large or small. Ceramic broilers, with clever arrangements for adjusting the food to the right heights for perfect results, were exhibited in such a way as to show how they can be placed in relation to the ranges and deep fat fryers when making up batteries of equipment.

When visitors were not at the gas section gas was kept before them. At one end of the hall, high above the tops of booths, was an immense but attractive sign which covered the front of the balcony and could be seen from every point. An effective wording surrounded a large clock. It simply said, "Gas for speed and profit. Always on time with gas."

Nine manufacturers cooperated in the gas section. They were American Stove Co., Automatic Food Equipment Inc., G. S. Blodgett, Inc., Detroit-Michigan Stove Co., Lenox Inc., J. C. Pitman & Sons, Savoy Inc., Standard Gas Equipment Corp., John Van Range Co. Each concern had its star hotel and restaurant contact men present day and night. Gas company representatives from throughout New England were also present and were busy making contacts.

In the large culinary display section of the exposition were dozens of features cooked or baked in gas kitchens of famous New England hotels. During the exposition Margaret Fawcett of Boston Consolidated Gas Co. gave a demonstration in the banquet kitchen of Hotel Statler on "Cakes and Muffins."

During the week, the Boston company featured in a prominent show window of their main building, a special display of gas fat fryers of the type that demonstrated bananas at the exposition. Also Roberts & Mander Stove Co. had a special display of gas stoves, using for the purpose an entire store on the first floor of the Hotel Statler.

The gas exhibit was arranged by a committee headed by Philip A. Nelles, Jr., New England Power Service Co., Boston, Mass. A. G. A. participation was through its Committee on Displays at National Industrial Expositions of the Industrial Gas Section, Paul J. Ziegelbauer, chairman.

On Thursday during the exposition the industrial division of the New England Gas Association met in Boston. Addresses were made by George S. Hawley, president, N.E.G.A., and Joseph F. Quinn, The Brooklyn Union Gas Co., and by the late L. B. Crossman. Mr. Hawley outlined the scope of the gas industry and of the American Gas Association and Mr. Quinn delivered a complete illustrated address on the Brooklyn experiences with commercial gas refrigerators.

Mr. Crossman outlined the development work in counter gas appliances in which he was engaged for the Committee on Industrial Gas Research. He had held a meeting of the Subcommittee on Counter Appliance Development the day before at which some important advances toward improving these appliances were made.

—E. D. M.

Commercial Cooking Units Feature Hotel Show

THE New Jersey Gas Association for the fifth consecutive year in cooperation with the American Stove Company, Atlantic City Gas Company, The G. S. Blodgett Co., Inc., Detroit-Michigan Stove Company, Radicon Company and the Standard Gas Equipment Corporation had an extensive display of commercial gas cooking appliances including ranges, broilers, bake ovens, deep fat fryers and counter appliances at the 20th Annual Spring Exposition and Convention of the New Jersey State Hotel Association.

The exhibit occupied a space 90 feet long. The attractive background was designed by S. H. Alexander, general display representative, and furnished by Public Service Electric and Gas Company.

Over 3,000 Hotel, Restaurant and Club representatives attended the show which was held at the Hotel Ambassador, Atlantic City, New Jersey, April 26-29. While this number was not as great as in former years those who did visit the exposition

showed considerable interest in new equipment. Nineteen gas appliances were reported as being sold and over 150 prospects for equipment were secured by the various exhibitors of gas equipment.

The cooperative gas exhibit was augmented by separate displays of gas equipment by Nathan Straus, Inc., and J. C. Pitman Company. The cooperative gas exhibit was organized by a special committee of the New Jersey Gas Association under the direction of H. A. Sutton, secretary-treasurer of the Association.

Industrial Gas Leader Dies Suddenly



L. B. Crossman

LESLIE B. CROSSMAN, assistant sales manager of the Boston Consolidated Gas Company and a national leader in the industrial and commercial end of the gas business, died suddenly April 27 at Durham, North Carolina, where he had gone to start his vacation. He was forty-four years old.

Mr. Crossman went to the Boston Consolidated Gas Co. in 1928 from the Surface Combustion Corp. Until assuming his duties as assistant sales manager early in 1937, he had been manager of the company's industrial division.

Known throughout the industry as an expert on commercial cooking and baking, he was one of the most active members of the A. G. A. Industrial Gas Section. At the time of his death he was a member of the Managing Committee of the Industrial Gas Section and chairman of the Subcommittee on Development of Counter Gas Cooking Appliances. He was a representative of this Section on the Approval Requirements Committees for Counter Gas Appliances and for Portable Bake Ovens, both committees of the A. G. A. Laboratories. He was also a director of the Industrial Division of the New England Gas Association.

Mr. Crossman's contributions were not confined to the development of effective sales methods but also extended to the mechanical field where he was adept at devising ingenious and practical devices, especially in connection with small commercial cooking appliances. His loss will be keenly felt in the gas industry.

Technical Section

J. V. Postles, Chairman

H. W. Hartman, Secretary

F. M. Goodwin, Vice-Chairman

Natural Gas Transmission and Production Problems Discussed in New Orleans

TRANSMISSION and production problems of the natural gas industry received thorough consideration at the annual convention of the Natural Gas Department in New Orleans, May 9-12. A number of sessions sponsored by the Transmission Committee under the chairmanship of A. L. Forbes, Jr., El Paso Natural Gas Co., El Paso, Texas, and the Production Committee, headed by W. Jennings Young, Oklahoma Natural Gas Co., Tulsa, were devoted exclusively to these problems.

B. M. Lulhere, technical supervisor, Southern California Gas Co., Los Angeles, led off the transmission sessions with an excellent paper on "Design of Liquid Separators for Natural Gas Pipe Lines." The first session also included a motion picture showing scenes in the laying of a submarine pipe line across the San Diego Bay.

Dehydration and Desulphurization Plant

A combination gas dehydration and desulphurization plant which is giving superior operating results was described by T. S. Bacon, research engineer, Lone Star Gas Co., Dallas. The plant was developed for the Northern Natural Gas Company. It has a designed capacity of 40,000,000 cu.ft. per day at 400-500 lbs. per sq.in. gauge pressure with 20 grains of hydrogen sulphide per 100 cu.ft. of inlet gas. It was put in operation Nov. 2, 1937.

Prior to the plant operation it was estimated that the treated gas would have a dew-point of 30-40 degrees F. and would contain about 0.7-0.8 grains of hydrogen sulphide per 100 cu.ft. Instead, the dew-point of the treated gas has been determined as averaging about 0 degrees F. and the hydrogen sulphide content of the raw gas has consistently been less than 0.2 grains per 100 cu.ft., even though the hydrogen sulphide content of the raw gas has run as high as 50 grains per 100 cu.ft. instead of the maximum of 20 grains originally estimated.

Mr. Bacon stated in conclusion: "It appears that the amine-glycol combination may be useful for dehydrating sweet gas that contains some carbon dioxide where low dew-points are required. It also appears possible to effect economies in the desulphurization of sour gas by the use of the glycol-amine solution, even though dehydration of the gas is not required."

A further progress report on the study of the hydrate problem in natural gas transmission lines was presented by W. M. Deaton and E. M. Frost, Jr., of the Bureau of Mines, U. S. Department of the Interior. An initial report was made at the 1937 convention of the Natural Gas Department which is cooperating in the study.

Partial dehydration of natural gas, or, if that process is not available, operation of the pipe line system at least once every few days at line pressures low enough to favor decomposition of gas hydrates are remedial measures recommended in the report.

Gas Hydrate Study

The study has progressed along four lines of attack, namely, review of the literature, field study of the problem, laboratory investigation of the physical and chemical properties of gas hydrates, and study of methods suitable for preventing or relieving freezeups in natural gas pipe lines.

Pressure and temperature surveys of pipe lines are being made. The report points out, with reference to data obtained from actual pipe line operation, that a pressure-temperature record used in connection with a hydrate melting-point curve for the gas, will indicate the proximity or presence of conditions favorable to hydrate formation. Without the pressure record, constriction in the line caused by hydrates may be passed unnoticed.

Both laboratory and field tests show that hydrates begin to break down almost immediately following a reduction of pressure to a value below the decomposition pressure. Accordingly, if pipe line pressure does not go through a daily cycle, during which it drops below the hydrate decomposition pressure, the pipe line might be operated advantageously in a manner that would permit weekly or bi-weekly reductions of line pressure to a value below hydrate decomposition pressure—thus freeing the line for greater and more efficient throughput.

Most of the hydrate decomposition curves, as determined by experimental work in the laboratory, plot as straight lines on semi-log cross section paper. Those for natural-gas hydrates are parallel. The slope of these lines, for which an empirical equation has been determined, is constant for all natural gases investigated.

As an adjunct in determining the effectiveness of various methods of gas dehy-

dratation and the efficiency and correct adjustment of dehydrating equipment, the Bureau has developed a new dew-point apparatus, which has been used by a number of operators, who have expressed their satisfaction in its performance. A detailed description of the Bureau of Mines apparatus for determining the dew point of gases under pressure was given in a separate report of investigations of the Bureau that was distributed at the New Orleans meeting.

Future work under the program includes the collection of data on the composition of the hydrates as they exist under pressure and in equilibrium with the gas from which they are formed. It is desirable from a practical operating view point to find some correlation of the hydrate-forming characteristics with the properties of the gas from which the hydrates are formed.

Welding Practice

Harold C. Price, H. C. Price, Inc., Bartlesville, Okla., summarized the results of improvements in electric welding of field joints of gas transmission lines since 1928 when the first lines were electric welded, as follows:

"There is no question about the strength of the shielded arc weld as compared with the old bare rod weld. A broken weld under the present method is practically unheard of. There was quite a bit of leakage in the first shielded arc welds. Today leakage has been practically eliminated.

"The speed of welding has been greatly increased with subsequent reduction in the cost of welding. For example, in 1930 our welders averaged only 1.45 rolling welds per hour on a 20-inch line and 1.28 rolling welds per hour on a 24-inch line using seven pounds of rod per weld. In 1937 the same man averaged 2.5 rolling welds per hour on a 22-inch line and used only four pounds of rod per weld."

Mr. Price based his paper on data from the experience of his organization which includes the electric welding of over 6,700 miles of oil and gas lines throughout the United States and covers the welding of 850,000 joints.

A new development in the oxy-acetylene welding of overland pipe lines was described by F. C. Hutchinson, The Linde Air Products Co., Kansas City, Mo. Multi-flame bell-hole tips and a new welding rod represent perhaps the most outstanding con-

tribution to this type of welding, he stated. Their use makes possible phenomenally fast welding speeds, high quality welds at minimum cost, and simplicity and flexibility of operation. "With the new tips and rod," he said, "it is now possible to realize all the advantages of the all-bell-hole or one-third roll methods of pipe line construction."

Robert J. Kuhn, consulting engineer, New Orleans, presented a paper entitled "Ten Years of Cathodic Protection in New Orleans," which summarized experience with a welded steel high pressure gas system laid in New Orleans in 1928. Soil conditions were such that the Bureau of Standards established two soil corrosion sites there and classified the New Orleans soils among the three worst in the United States. Mr. Kuhn said that estimates of the life of steel pipe were made at seven years and actual experience on several steel pipe systems nearby proved that corrosion leaks would occur in less time than that. However, the steel high pressure gas system has been in the ground now about ten years and, to date, not a single corrosion leak has developed in the system, he reported. How these results have been accomplished was brought out in Mr. Kuhn's paper.

Conservation Symposium

The production sessions at the convention opened with a Conservation Symposium. In the absence of L. B. Denning, president, Lone Star Gas Company, the symposium was conducted by N. C. McGowen, president, United Gas Pipe Line Co., Houston. Valuable discussion of the conservation laws and practices of five states was presented by W. G. Rankin, commissioner, Louisiana Department of Conservation; W. J. Armstrong, conservation officer, Corporation Commission, Oklahoma; E. C. Dahlgren, director, Conservation Division, Corporation Commission of Kansas; A. M. Crowell, chief conservation agent, Arkansas Board of Conservation; V. E. Cottingham, director of production, Railroad Commission of Texas.

What the oil industry is doing about conservation was the subject of a paper by H. M. Stalcup, Skelly Oil Co., Tulsa, presented at the symposium. Stressing the profession of petroleum engineering as a vital factor in advancing conservation, Mr. Stalcup gives a large share of the credit for conservation advances to these engineers. Maintenance and proper utilization of natural formational energy he termed "the very essence of efficiently recovering the greatest possible percentage of recoverable oil in any reservoir." He listed numerous improvements in operating practices and mechanical perfection which have favorable influence upon conservation.

He referred to the long prevalent waste in the Panhandle field of Texas as a "violent and utterly unthinkable actual physical waste of gas until it was on the verge of becoming a national scandal." The two and a half trillion cubic feet of gas wasted in this one field since its inception, he said,

PRODUCTION AND CHEMICAL CONFERENCE IN SESSION

As this issue of the A. G. A. MONTHLY goes to press, the annual joint conference of the Production and Chemical Committees is in session at the New Yorker Hotel, New York City. The three-day conference, ending May 25, will be reported in full in the next issue.

could be compared to 3,250,000 carloads of coal, enough to form a train 21,564 miles long.

Of House Bill 266, passed by the Texas Legislature in 1936 to end gas wastage in the field, he said, "This measure has often been referred to as the most comprehensive conservation statute so far enacted by any of the states," and added that it has brought "the volume of avoidable waste of gas to a negligible if not an irreducible minimum."

Concluding, he said: "Despite all that has been said as to the substantial progress so far made in the industry in the elimination of wasteful practices, it is thought that we are still but on the threshold of the progress yet to be made in true conservation. . . . The important, the encouraging point, however, is that we are making definite progress toward our goal."

Other speakers taking part in the Conservation Symposium were: E. O. Bennett, Continental Oil Company, Ponca City, Okla., and Kenneth Eilerts, U. S. Bureau of Mines, Bartlesville, Okla.

Natural Gas Field Problems

Field problems of the natural gas industry were discussed at the Wednesday afternoon session of the Production Committee, presided over by W. Jennings Young, vice-president, Oklahoma Natural Gas Company.

Discussing the best method of well spacing in the recovery of natural gas, D. T. MacRoberts, United Gas Pipe Line Co., pointed out that the number of wells that will assure a maximum return to the owner of the land or to the producer of the gas will not necessarily be the same as the number required by the needs of the pipe line company. A field with 100,000,000 cu.ft. of gas and an initial pressure of 1000 lbs., if abandoned when pressure drops to 100 lbs., could have produced 86,000,000 feet from one well while four equally spaced wells would have added less than 1 per cent to this amount, and 8,600 wells, or one to the acre, would have produced only 87.7 billion feet.

However, since pipe lines operating from the field must be assured a fairly constant load, and the open flow capacity of the wells drops with the pressure, it is necessary to drill additional wells to maintain an even supply. Thus the question of well spacing in natural gas production is economic, he asserted. If 80 per cent of the reserve is considered ultimately "available," but must be produced at the rate of

8,000,000,000 cu.ft. a year for 10 years, the number of wells required can be determined, and the price at which the gas is sold will then determine whether the operation is profitable or results in loss.

"The problem of gas well spacing is economic in nature," he said. "On that basis it is possible to show that there is a certain well-density which will yield the highest net income. The amount of gas recovered under this particular "ideal" spacing program is the "available" reserve. The drilling program in any field should be based on that ideal spacing and its consequent available reserve."

H. P. George, Southern California Gas Co., Los Angeles, presented data showing the greater utilization of gas in oil field operations of his state. The control of gas-oil ratios in the California fields indicates considerable progress in the present day plan of conserving gas in every way possible rather than to waste it as a "nuisance" such as was done a few years ago.

Mr. George gave some outstanding examples of the utilization of reservoir energy in the development of fields.

Utilization of Casinghead Gas

He asserted that "there is a definite trend toward wider utilization of casinghead gas by the producers, which may affect the volume available to gas purchasing companies. Offsetting this is the disposition of producers generally to produce wells at lower gas-oil ratio and thus prevent uneconomical dissipation of reservoir energy and conserve gas from unnecessary waste. Although this may result in a reduction in total volume of casinghead gas immediately available it will inevitably extend the productive life of the fields and increase the ultimate yield of oil."

Problems of natural gas operators in the eastern fields were presented in an excellent paper prepared by George E. Welker, United Natural Gas Co., Oil City, Pa., last year's chairman of the Natural Gas Department.

M. E. Chapman, of the Chemical Process Company, Inc., Tulsa, discussed the treatment of wells in calcareous formations with acid to increase yield, and declared that experience has shown that better results are obtained if the mixture is forced into the producing formation at a rapid rate and the flow of the well quickly reversed so as to clear out the space at the bottom of the hole.

Robert Garrett, of the Arkansas Natural Gas Co., Shreveport, La., in leading the discussion on the problem of acidizing wells, pointed to the lack of adequate information prevailing in many cases prior to the operation. Insoluble elements in the calcareous formation can clog the channels leading to the well, he said, and where the water table is close to the bottom of the well it should be determined whether permeability of the stratum is greater in a horizontal than in a vertical direction, before the risk is taken of opening up a way for the water to reach the bottom of the hole.

New Low Price for Gas House Heating Report

A NEW low price of \$1.00 per copy has been announced for the valuable A. G. A. report, "Economics of Gas House Heating," which was published in April, 1936. The previous price was \$3.00 per copy. The report serves as a guide in analyzing the costs and expenses of obtaining, supplying and holding the house heating business. More than 800 copies have been distributed to date.

The report also covers the influence of taxes, the ability of the public to buy house heating in relation to income data, the premium which may be reasonably expected for gas over other fuels, and the fundamentals of market analysis. It should prove invaluable to gas company executives, sales managers, house heating department heads, rate and cost analysts, and all others interested in promoting the house heating business.

Will Connect Approved Appliances Only

GAS companies in the Melbourne, Australia, metropolitan area have decided that, on and after June 1, they will connect to their gas services only those gas water heaters (contact types) and gas wash coppers which bear the Badge of Approval of The National Gas Association.

In order that the least possible hardship should result to manufacturers and purveyors of these appliances, a meeting thereof was held in Melbourne on February 16, when June 1 was agreed to as the date upon which the decision of the gas companies referred to should operate. —(*National Gas Bulletin*, Australia, March, 1938.)

Dr. Wittmer Appointed Personnel Director

FOLLOWING the retirement of Colonel J. P. Jackson, Dr. J. J. Wittmer, medical director, has been appointed director of the Personnel Department, Consolidated Edison Company of New York, Inc. Dr. Wittmer retains supervision of the Medical Department which is now a part of the Personnel Department.

WASHINGTON OFFICE

(Continued from page 231)

also the kind and number of appliances sold.

In fact, most of the government departments call on me frequently for either assistance in solving fuel problems or furnishing them various kinds of information. Major Forward and his entire staff have been most helpful to me in my work.

In handling gas fuel contracts for government projects it is necessary for me to have the closest possible contact with manufacturers, for the cost of appliances and equipment is very often the determining factor in these matters. I must, therefore, have close contact with the Association of Gas Appliance and Equipment Manufacturers and with individual manufacturers in order that I may be able to supply the detailed information frequently requested of me. In my work the manufacturers are just as big a factor in the industry as the gas company itself.

A typical day in the Washington Office:

A call from the War Department to ascertain if a wholesale gas rate can be obtained for a hospital at some given point.

A call from the Navy Department asking to be advised where they can get information on gas burning annealing furnaces.

A call from the Bureau of Indian Affairs to learn if we have any locking devices for appliances whereby curious Indian children cannot turn gas cocks on and off.

A call from the Procurement Division to ascertain what rate would apply for a post office building somewhere in Texas.

A call from the United States Housing Authority requesting me to get them a gas rate on a 500-apartment housing project for cooking and refrigeration.

A call from the Veterans Administration to ask if a certain appliance has our Laboratory approval. I might add right here that after more than five years of effort, every Government Department now specifies that all gas burning appliances and equipment must have A. G. A. Laboratory approval.

This will give you some idea of how the Washington office can and does help the gas industry.

WATER HEATER CONSUMPTION

(Continued from page 222)

derived for the gas consumption of a storage water heater. The formula is general in that any values of performance coefficients (standby loss, effective thermal efficiency) physical constants (hot water load, burner input rate, tank volume) and temperature conditions (temperature difference between outlet and inlet water, between stored water and room) may be substituted to yield the gas consumption of the appliance. Should it be desired to calculate the service efficiency of a water heater an equally general expression may be arrived at from the same article:

form originally used in the December, 1937, A. G. A. MONTHLY article.

An equation for service efficiency is given in a footnote to a paper by F. J. Rutledge in the A. G. A. MONTHLY, March, 1938, p. 92. This equation is as general in form as equation 8 above, and as the monthly gas consumption formula developed in the author's earlier paper in the A. G. A. MONTHLY for December, 1937, p. 417. The Rutledge footnote, however, refers to an article in the June, 1935, issue of the A. G. A. MONTHLY, but on reference to this article the general form for the service efficiency equation is not to be found. Those interested in the derivation of the more general

$$\text{Service efficiency} = \frac{\text{Heat added to water (B.t.u./day)}}{\text{equation (6)}} \times 100, (\text{per cent})$$

$$(8) = \frac{8.33 Gt_i}{\frac{8.33 Gt_i}{e'_{ut}} + \left(24 - \frac{8.33 Gt_i}{e'_{ut}q}\right)(8.33 VS_t)} \times 100, (\text{per cent})$$

$$(9) = \frac{8.33 Gt_i}{\frac{8.33 Gt_i}{e'_{ut}} + 1 - \frac{8.33 VS_t}{q} + 24(8.33 VS_t)}, (\text{per cent})$$

A simplification is introduced by basing the service efficiency on monthly quantities as may be seen by multiplying both the numerator and denominator of equation (9) by 30. Thus, The form of equation (10) is preferred inasmuch as it preserves the

formula are referred to the writer's paper in the A. G. A. MONTHLY, December, 1937, where the derivation is given in detail and important factors are discussed which must be included if calculated values are to agree with values obtained from draw off tests.

$$(10) \text{ Service efficiency} = \text{eq. (9)} \times 30$$

$$= \frac{25000 Gt_i}{\frac{250 Gt_i}{e'_{ut}} \left(1 - \frac{h}{q}\right) + 720h}, (\text{per cent})$$

where $h = 8.33 VS_t$

AUDITING—WHAT IS IT?

(Continued from page 229)

assignment, the local audit work must be complete. We have not only the general accounting office where the transactions general to the business in all locations are carried out, but also local accounting offices where customers' accounts are maintained, where stores records are kept, where pay-roll records are prepared, and where the first reports of the operations of the business arise because they must be made by those who carry out those operations.

The local office auditor has to verify that the detailed accounts in the local offices reconcile with the control accounts maintained in the general offices, that all the revenue which should be reported is reported, that the report of stores issues reflects actual issues properly authorized and actually requisitioned for the company's use, and that the pay-roll includes only properly authorized employees for time actually worked at rates approved by the management, and that management policies are observed.

It now appears desirable to pay some more direct attention to the relationships which are being discussed, namely, those of the internal audit to the annual audit, and of the accounting organization to the annual auditor. Here we have described a chain in the upside down fashion, for really the local office accounting organization and the local office auditor are the base of the pyramid and the outside public accountant at its peak.

Natural Accounting Divisions

When we consider the many natural divisions of a public utility accounting organization, we can see that each has its own problems for the auditor and special applications for the principles of internal check. Brief references have already been made to customers' accounting, pay-roll, materials and supplies and accounts payable accounting. I will pass transportation, residuals and appliance accounting, but there is one other that in my opinion deserves special mention and that is fixed capital accounting and property records.

I think of the Fixed Capital accountant as the custodian of the company's investment. He needs to know as much about it as can be learned. He needs to know description, cost, location, life in service and when it is retired from service. He could not ride around on the shoulder of even one foreman, and if he could, he wouldn't know what the rest were doing, so he needs every application of internal check that can be devised. Material disbursements indicate that material is withdrawn from stock, but a Finished Work Report is the best evidence of its being installed in plant, and the mapping of the work order by the engineers makes that evidence even more valued and may help to insure the reporting of a retirement.

Time charged to accounts and work orders is something, but foremen's reports in terms of trench dug and feet of main

laid are valuable substantiating evidence.

It is not enough to insure that the receipts of the company are all deposited to its credit in the bank or that the bank accounts are diminished only by disbursements properly made and authorized. It is important to distinguish in accounting between that which affects income and that which affects investment. So the auditor must learn enough of the engineer's side of the business to know the difference between maintenance and a replacement to distinguish a betterment from a replacement.

A public accountant verifying fixed capital and having presented to him a series of construction orders with substantiating detail developing the cost of the job from the engineer's statement of construction completed through the final completion order, should be in a position to verify the charges with a minimum amount of effort

and with confidence that the company verification has insured accurate accounting before being submitted to his scrutiny.

He should find records of cash expenditures reflecting proper authorization for purchases, complete verification of each step of the transaction and the proper and adequate delegation of authority for approving and signing of checks; materials and supplies records supported by properly signed requisitions, adequate control of physical stores, a balanced inventory reconciled to general ledger controls, and so it goes—every item on the balance sheet could be discussed and means of adequate internal control to materially assist the public accountant reduce the number of adjusting entries and produce savings could be described.

The function of the public accountant is not only that of an examiner but of an advisor.

Personnel Service

SERVICES OFFERED

Insurance Specialist, graduate engineer, experienced utilities, operating and holding company, meter reader to junior executive; specialized five years in producing large economies in insurance protection of all kinds for utility companies. Available special reports or full time. 1193.

Engineer—College graduate with over five years' experience utilization department of large gas company and two years engineering department of eastern stove manufacturer. Desires position in engineering department appliance manufacturer. 1194.

Supervision or Sales Engineer—very familiar with the many phases of domestic, industrial, commercial and househeating sales work. Have supervised sales, surveys, installations and trained men. Want to make a permanent connection with a utility or appliance manufacturing company. 1196.

Salesman desires high-grade gas range line which has been approved by gas appliance and equipment merchandisers. Traveling Ohio, West Virginia and Kentucky for many years. Excellent connections with utilities and well-rated dealers. 1197.

Chemist (Ph.D., 1932). Six years' industrial experience, largely in new-product development, control and manufacturing. Experience includes executive responsibilities, purchasing and travel. Extensive acquaintance among scientific workers. Available immediately to go anywhere. 1198.

Gas Engineer 12 years with large utility, also exceptional experience in manufacture of tinned steelcase meters, thoroughly familiar with all phases of gas meter repair work, also industrial metering by positive displacement meters, desires position in supervisory capacity. West or middle west preferred. Married, family. (37). 1199.

Young man, seeks position as construction accountant, junior executive, or executive assistant. Four years' experience as above with one of most prosperous and progressive gas companies in east. Graduate in mechanical engineering and business administration. Responsible, best of references. Available immediately through no fault of own. Location immaterial. Salary open. (29). 1201.

Executive, American, who has been chief engineer of two well known gas range companies; efficiency engineer or production. Desires to become affiliated with some good company manufacturing gas range or heating equipment. Best of references presented to whoever is interested. (36). 1202.

SERVICES OFFERED

Engineer—unusual qualifications valuable to large bank or active gas utility, 18 years' experience field work and appraisal oil gas and natural gasoline properties prospects and markets; preparation and support of reports for rate making, purchase and re-financing; analysis financial records; extensive technical writer; present connection too restricted in range. 1203.

Engineer (26) single, sales minded, accustomed to traveling. Formerly with prominent manufacturer of gas appliances in development, laboratory, design and sales service work. Seeks employment with manufacturer or utility as sales engineer, development, sales service, service management industrial engineer or other work. B. S. 1204.

Young Gas Engineer—graduate mechanical engineer, 4½ years actual employment includes work in research testing laboratory of a leading manufacturer of heating and water heating appliances, servicing gas boilers and meter repair work for gas company; familiar natural and manufactured gases. Also experienced machine designer, mechanical and electrical draftsman. Married. 1205.

Gas Engineer—technical graduate with over fifteen years' broad experience in gas industry as foreman, engineer, and superintendent of operating companies and gas engineer of large holding company. All phases of plant and distribution operation. 1206.

Graduate Gas Engineer, experienced in distribution problems, pressure regulation, corrosion problems, gums, etc. Also experienced in house heating and commercial heating including heating estimates, equipment selection, complaint work, trouble correction, balancing of warm air systems and regular engineering inspection. 1207.

Gas Engineer, over 6 years' experience in high and low pressure transmission and distribution practice, designs, physical and chemical research; recent experience in rate case work. Familiar with water gas manufacture. Previous 5 years' experience as sanitary engineer. Graduate; licensed (34). 1208.

Experienced manufacturer's **Salesman**—for national distribution of products used in distribution and application of gas. 14 years' with well known firms handling appliances, pipe fittings and air conditioning equipment as salesman and sales manager. 1209.

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